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Note.—Initialed reviews are written by the following:—

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* General studies, see also individual crops.

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Plant Breeding Abstracts

Vol. XXII, No. 3

*STATISTICS

1565. OLLAGNIER, M.
Forme, dimension des parcelles et nombre de répétitions dans les essais culturaux sur arachide et sur palmier à huile. **(Shape, dimension of plots and number of repetitions in cultivation experiments on groundnut and on oil palm).**
Oléagineux Rev. Gén. Corps Gras Dérivés 1951 : **6** : 707–10.

Experiments with an annual (groundnut) and a perennial (oil palm) show that, though the largest plots and the highest number of repetitions gave the greatest accuracy, if the experimental area is constant, the smallest plot size with a proportionately increased number of repetitions gives the best results.

1566. NISSEN, Ø.
En plan for faktorielle forsøk med hovedvekten på bestemmelse av samspillene. **(A design for factorial experiments when the determination of the interactions is of major interest).**
Forskning Forsøk Landbruk., Oslo 1951: **2** : 203–14.

Two different designs are discussed. In both cases two different experimental factors are used on long, narrow plots, superimposed at right angles on the same area. The second design, which is new, is appropriate when it is practical to use very long, narrow plots. The disadvantage of the design is a high number of subplots. In many cases, however, this high number of replications can be used advantageously by superimposing other experimental factors on the blocks of the two first factors. If the maximum number of such "additional" factors is used, the main effects of the additional factors and the interactions between the additional factors *inter se* cannot be tested. A valid error, however, for testing the interactions between the two primary factors and the additional factors can be found.

1567.
Über die Unsicherheit in Anbauversuchen und ihre Bedeutung für die Auswahlsarbeit in der Pflanzenzüchtung. **(On uncertainty in field trials and its significance for selection work in plant breeding).**
Pajbjergfondens Forsøgs- og Forædlingsarbejde 1950 : 27–38.

An analysis is given of the relative importance of genetic, environmental and seasonal variation in determining the results obtained in the variety trials conducted by the Pajbjerg Foundation.

1568. KALTOFEN, H.
Einige Bemerkungen zum Feldversuchswesen, insbesondere zur Prüfung von Verrechnungsmethoden mit Hilfe von Modellversuchen. **(Some observations on experimentation in field trials, especially on the testing of methods of calculation by the aid of model experiments).**
Z. Acker- u. Pflanzenbau 1952 : **94** : 345–52.

The newer statistical methods of evaluating differences and errors found in the individual tests involved in field trials are critically discussed.

Three fundamental conditions are set out which must be fulfilled by measurements in the separate observations in a field trial in order to prove the validity of any chosen method of evaluating errors, differences or other values determined statistically. It is shown that in actual field trials, two of these essential conditions are not fulfilled and the third only partially and, therefore, an actual field trial cannot be used in testing the validity of a method of evaluation; instead, the best way is by working with model experiments, since in them are present the conditions for determining the true values of yields, etc. Here, also, however, a reservation must be made, since in experiments, such as those on manuring or spacing, in which external factors affecting

* General studies, see also individual crops.

growth are being varied, the true yields follow, at least approximately, the law of action of these factors, but in cases such as variety or strain trials, or comparisons of species, in which to a certain extent the internal factors affecting growth are being varied, the laws underlying yield formation are scarcely known; hence in the former case, model experiments can be planned on a basis of physiological regularities, but not in the latter, where internal factors are being varied.

1569. THOMPSON, D. J. and HUTCHCROFT, C. D.
Accuracy of estimating the mean percentage of nondetasseled plants in double cross corn seed production fields.
Agron. J. 1951 : **43** : 609–16.

Sampling methods used in field inspections of maize in Iowa prior to seed certification are discussed with particular reference to the detection of male inflorescences inadvertently remaining on pistillate parents.

*GENETICS

1570. SÁNCHEZ-MONGE, E.
Glosario de términos de genética y citogenética. Nuevos términos y usos. II. (**Glossary of genetical and cytogenetical terms. New terms and definitions. II.**)
An. Estac. Exp. Aula Dei 1952 : **2** : 270–76.

Continuing his earlier papers on Spanish genetical terminology (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2020 and Vol. XXI, Abst. 2298), the author adds some new terms and redefines others to bring them into line with current usage.

1571. BÁLINT, A.
A morganista genetika kártétele növénynemesítésünkben. (**The harmful influence of Morganist genetics on our plant breeding.**)
Agrártudomány, Budapest 1951 : **3** : 338–45.

At a plant breeders' conference held in Hungary during May, 1951, western genetics was condemned as of little practical use, and for its concept of chance mutation, neglect of environmental influences and excessive regard for genetic purity.

1572. JAKUBCINER, M. M.
(**Some observation on the programme for Darwinian studies**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 6 : 76–77. [Russian].

Two new programmes, one proposed by Prezent (cf. *Plant Breeding Abstracts*, Vol. XX, Absts. 1470 and 1471), the other by Dvorjankin are discussed. It is suggested that the influence of Virchow, Weismann and Morgan might be effectively counteracted by emphasis on the work of Lepešinkaja and Bošjjan, more especially on the evidence of life existing apart from the cell. Darwin's failure to define the species and his notion of competition within the species are criticized.

1573. TAKANASHI, N.
(**The significance of mutation for evolution and breeding. In the light of Lysenko's theory**).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 51–52. [Japanese].

After a brief historical survey of evolution and genetics from Darwin onwards, an appreciative account is given of Lysenko's theory of phasic development and the genetical consequences that can be drawn from it. The author is impressed by the possibilities Lysenko offers of directing mutation in desired directions.

1574. MAINLAND, G. B.
A short method of calculating an F_2 dihybrid segregation with linkage.
J. Hered. 1951 : **42** : 291–92.

A method of calculating an F_2 dihybrid segregation ratio involving linkage is described. It requires only four steps of calculation after the proportion of the double recessive gametes has been determined, whereas the Punnet square method involves a minimum of 52 steps subsequent to the determination of the frequencies of all four types of gametes.

1575. DAWSON, G. W. P. and WHITEHOUSE, H. L. K.
The use of the term "gene."
J. Genet. 1952 : **50** : 396–98.

Two ways of employing the term gene are discussed with reference to definitions and usage in early and recent genetical literature: (1) equivalent to an individual hereditary unit, alleles being regarded as separate genes; and (2) equivalent to a series of alleles, in which case the term is collective. The term panallele is

* General studies, see also individual crops.

proposed as a collective noun for all the alleles at a locus.

1576. HOLLANDER, W. F.
Recessive genes epistatic to dominants.
Genetics 1951 : **36** : p. 555. (Abst.)
Occasional records of recessive mutants epistatic to dominant genes necessitate a revision of the definition of epistasis, often applied only to dominant genes, as follows: "the masking of the phenotype of a mutant or non-standard gene by that of another, not an allele."

1577. MAINLAND, G. B.
Muller's method of calculating population sizes.
J. Hered. 1951 : **42** : 237–40.
A modification of a formula derived earlier by Muller for estimating the number of individuals required in a particular generation to obtain a particular segregate is derived. The modification is

$$n = k\,(r + \tfrac{1}{2}),$$

where n = the number of individuals required, $k = -\log_e\,(1 - p)$, where p is the desired probability level, and r = the ratio of the theoretically expected undesired types over the desired types. A table is given of k for probability levels ranging from 90 to 99·9%.

1578. GARBER, M. J.
Approach to genotypic equilibrium varying percentages of self-fertilization and cross-fertilization (one autosomal gene-pair).
J. Hered. 1951 : **42** : 299–300.
Formulae are given for the frequency of AA, Aa and aa gene combinations after n generations in a plant with a frequency r of self fertilization and $1 - r$ of cross fertilization.

1579. MANCINI, E.
La produzione delle sementi ibride. **(The production of hybrid seed).**
Riv. Ortoflorofrutticolt. Ital., Firenze 1952 : **77** : 12–21.
The utilization of heterosis in breeding is discussed, with special reference to the tomato, onions, tobacco and some Cucurbitaceae.
In the tomato S. Marzano 200 male sterile plants were found to include 14 different types of mutants in which sterility was determined by a single recessive gene. One of the male sterile mutants had fertile pollen contained in indehiscent anthers. This condition can be made use of to obtain 100% male sterility in the offspring by bursting the anthers manually and selfing the functionally sterile flowers. Male sterile mutants can also be propagated clonally.

1580. ROBERTSON, F. W. and REEVE, E.
Studies in quantitative inheritance. I. The effects of selection of wing and thorax length in *Drosophila melanogaster*.
J. Genet. 1952 : **50** : 414–48.
Theories on the inheritance of quantitative characters proposed by Mather and others, and the possible effects of continued selection on a quantitative character are discussed. It is concluded that genes affecting quantitative characters have no special qualities distinguishing them from other genes. The experimental data suggest that progressive alteration of the genotype may create conditions in which alleles previously indistinguishable from each other can be selected and that appropriate changes in the environment may have the same effects. Certain alleles difficult to fix may have their effects magnified by selection of the genetic background; this possibility would explain the rise in variance of a character which has been subjected to selection for many generations.

1581. BEALE, G. H.
Antigen variation in *Paramecium aurelia*, variety 1.
Genetics 1952 : **37** : 62–74.
Each stock of variety 1 possesses alleles at three independent loci, g, d and s, concerned with antigen production; possibly several more loci exist. Each stock has characteristic alleles at each locus, although some alleles may be common to several stocks. Four, three and two alleles have so far been found for the g, d and s loci respectively. In general, antigens corresponding to an allelic series are serologically related. Normally only genes at one of the three loci are expressed at a given time; which locus is expressed depends upon the state of the cytoplasm. The cytoplasmic state is to some extent determined by temperature. The stability of corresponding cytoplasmic states under standard environmental conditions varies widely in different stocks and is presumably controlled by hereditary factors. The mode of antigen production in variety 1 is essentially similar to that recently suggested by Sonneborn for variety 4.

1582. KIHARA, H.
(Methods for nuclear substitution).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 20–21. [Japanese].
Breeding techniques are described whereby the nucleus of one line may be transferred to the cytoplasm of another.

1583. *Medinec, V. D.
(The characters of the maternal organism in the hybrid progeny).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 7 : 3–12. [Russian].
This general survey of the influence of maternal tissues on the offspring of reciprocal crosses considers the selective action of the stigma, with respect to pollen germination, and the nutritive influence of the endosperm on the embryo.

1584. Blaringhem, L.
Plantes annuelles et plantes vivaces; xénie des plantules. **(Annual and perennial plants; xenia).**
C.R. Acad. Sci. Paris 1945 : **221** : 332–35.
The incidence of xenia among wild and cultivated plants is discussed, together with its possible connexion with annual or perennial habit.

1585. Malécot, G.
La consanguinité dans une population limitée. **(Consanguinity in a finite population).**
C.R. Acad. Sci. Paris 1946 : **222** : 841–43.
In a finite free-breeding population of N individuals, after the nth generation, there is a drift towards genetical homozygosity if the individuals are monecious or diecious. If N is a function of n, then the population tends to homozygosity if N (n) remains finite; if, however N (n) tends to infinity, then the population will either tend to homogeneity as above or maintain heterozygosity. The principal means, however, whereby heterozygosity is maintained are mutation and immigration of new genes.

1586. Stephens, S. G.
Possible significance of duplication in evolution.
Advanc. Genet. 1951 : **4** : 247–65.
On the basis of the hypothesis that each locus is concerned with one primary function as a consequence of its highly specific surface structure, a mutation would imply loss or impairment of the original function with or without the concomitant acquisition of a new one. Theoretically, duplication of loci would offer a means of gaining a new function without loss of the old one. It might therefore be possible to discover loci of duplicate origin which now perform different functions. Criteria for distinguishing duplicate from nonhomologus loci are analysed and some possible cases of divergence in function of duplicate loci in plants and animals are examined. No single case, however, can at present be found which satisfies all the requirements necessary to establish the ocurrence of duplicate loci with divergent function. It is suggested that further investigation is required and that the red cluster linkage group in amphidiploid cotton may provide a valuable subject of analysis in this connexion.

1587. Bruhin, A.
Auslösung von Mutationen in ruhenden Samen durch hohe Temperaturen. **(Induction of mutations in resting seeds by high temperatures).**
Naturwissenschaften 1951 : **38** : 565–66.
At altitudes of 3000 m. in the alps a maximum number of mutant forms and chimeras was found in populations of *Crepis aurea.* It was observed that the achenes remain for a whole year, exposed to great extremes of temperature, before germinating. Seeds of genetically pure material when exposed to these conditions showed chromosome disturbances in 70–80% of their seedlings, the longest chromosome being the most frequently affected. The absence of two homologous chromosomes was also more frequent than would be expected purely on a probability basis.

1588. Wijsman, R. A.
On the interpretation of the dose-frequency curve in radiogenetics.
Genetics 1951 : **36** : 478–87.
Calculations are presented supporting the assumption that a linear relationship between mutation frequency and radiation dose exists only when a mutation is caused by a single primary ionization. It is shown that Opatowski's curve (cf. *Plant Breeding Abstracts,* Vol. XX, Abst. 1342) represents mutation by a single event; thus there is no evidence that a mutation by many ionizations can give rise to a linear curve.

1589. Di Paolo, J. A.
Studies on chemical mutagenesis utilizing nucleic acid components, urethane, and hydrogen peroxide.
Amer. Nat. 1952 : **86** : 49–56.
Larval injections with nucleic acid components and other nitrogen bases, hydrogen peroxide or urethane failed to increase the rate of sex-linked lethal mutation in *Drosophila.* The direct action

* An extended summary of this paper is on file at the Bureau.

of Superoxol fumes on male larvae and adults also gave negative results. A combination of methane injection and treatment with Superoxol fumes, however, caused a significant increase in the rate of sex-linked lethal mutation; this result is considered to be a synergistic effect.

1590. Bonnier, G., Lüning, K. G. and Arnberg, B.
On a possible mutagenic effect of X-rayed egg cytoplasm.
Hereditas, Lund. 1952 : **38** : 109–12. (Abst.).

Experiments on *Drosophila melanogaster*, in which the production of sex-linked lethals was analysed, have indicated that if fertilization occurs within a few hours after X irradiation of the female flies an indirect mutagenic effect may be exerted by the irradiated cytoplasm of the egg upon the paternal chromosomes.

1591. Stevens, C. M. and Mylroie, A.
Mutagenic activity of compounds related to mustard gas.
Fed. Proc. 1951 : **10** : 253–54.

Monofunctional β-chloroethyl sulphides and a sulphonium compound were found to induce mutations in *Neurospora crassa*. The β-chloroethyl amines tested varied in mutagenic activity, while β-chloroethyl sulphones and vinyl sulphones proved inactive.

1592. Smith, H. H. and Srb, A. M.
Induction of mutation with B-propiolactone.
Science 1951 : **114** : 490–92.

Treatment with aqueous solution of β-propiolactone caused gene reversions to independence of adenine and inositol and mutations resulting in resistance to the antibiotic effects of canavanine in biochemical mutants of *Neurospora crassa*, and also chromosome aberrations in root tips of *Vicia Faba*.

1593. Alexander, P.
Interference with the formation of a nucleoprotein complex by radiomimetic compounds.
Nature, Lond. 1952 : **169** : 226–27.

Radiomimetic polyfunctional compounds were found to reduce the affinity of thymus nucleic acid for the protein salmine to a much greater degree than monofunctional compounds. It is suggested that polyfunctional compounds, by neutralizing adjacent anionic groups in the nucleic acid, may destroy molecular rigidity maintained by electrostatic repulsion. Thus the biological action of radiomimetic compounds may be through their alteration in the shape of the nucleic acid, whose function, according to Haurowitz, may be to maintain the "template protein" in an expanded state during biosynthesis.

1594. Bergann, F.
Haberlandts Crataegomespilus-Studien, ein Beitrag zur Frage der vegetativen Hybridisation. (**Haberlandt's *Crataegomespilus* studies, a contribution to the problem of vegetative hybridization**).
Züchter 1951 : **21** : 245–53.

The graft hybrid problem is discussed in the light of the views of Haberlandt, Winkler and Baur.
The author concludes that *Crataegomespilus* is a periclinal chimera and not a burdo.

1595. Waddington, C. H.
Selection of the genetic basis for an acquired character.
Nature, Lond. 1952 : **169** : p. 278.

In an experiment on *Drosophila*, selection for and against a crossveinless phenocopy produced in response to temperature shock was carried out. From the twelfth generation onwards in the stock selected for formation of the phenocopy, flies showing the crossveinless phenotype began to appear even among individuals which had not received temperature treatment. Matings between these flies have given rise to strains which regularly produce crossveinless individuals when raised at normal temperatures. It is suggested that a third possible mode of adaptation, in addition to the opposed views of natural selection of chance variants and inheritance of acquired characters, should be considered. Natural selection, it is suggested, acts not only on fortuitous variants resembling the phenocopy produced in response to the environment but also on the sensitivity of normal individuals to the environmental stimulus. Genotypes sensitive to the external stimulus also reinforce the action of any genes producing similar phenotypes and also canalize their activity towards the exact expression which is under selection.

EVOLUTION

1596. Small, J.
Quantitative evolution. XX. Correlations in rates of diversification.
Proc. Roy. Soc. Edinb. 1950–51 : **64** : Ser. B : 277–91.

Further work concerning the speed of evolution for species, genera and families of diatoms (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1572)

is summarized. Diversification among the progeny of a single monotypic genus in a monogeneric family is represented by eight diagrams illustrating the ratios of geometrical progressions or logarithmic increases for total number of species, total number of genera, new monotypic genera, sizes of large genera and their derivative genera, mean size of genera in a group and frequency distributions of generic sizes.
In some groups where species and genera have not suffered from a high degree of extinction due to external conditions, and where diversification and a constant proportion of extinctions have been due to innate causes, new monotypic genera have appeared consistently at half the rate for the appearance of new species in any one genus. Thus after 10 or 12 steps of progression these differences in the respective rates of evolution of genera and species have led to a considerably larger number of species than genera.

1597. STEBBINS, G. L. (JUN.)
Natural selection and the differentiation of angiosperm families.
Evolution, Lancaster, Pa. 1951 : **5** : 299–324.

The author presents the hypothesis that the combinations of characteristics found in the larger, more successful families of angiosperms evolved through the guidance of natural selection, since they represented particularly successful methods of solving problems of fertilization, seed dispersal or both. Evidence to support this hypothesis has been obtained by surveying all the families of the angiosperms with respect to the primitive or advanced expression of eight diagnostic characters: presence *vs.* absence of petals; polypetaly *vs.* sympetaly; actinomorphy *vs.* zygomorphy; numerous *vs.* few stamens; apocarpy *vs.* syncarpy; numerous *vs.* few ovules; axile *vs.* parietal, apical *vs.* basal placentation; and hypogyny or perigyny *vs.* epigyny.

1598. ROBERTY, G.
Les déterminations infra-spécifiques.
(Infraspecific determinations).
Bull. Soc. Bot. Fr. 1951 : **98** : 228–30.

Regarding the evolution of living organisms as though subject to the laws of energy, the author has evolved a semimathematical method of approach to the determination of plants belonging to subspecific groups. His theory is exemplified with reference to cotton species.

1599. RILEY, H. P.
Ecological barriers.
Amer. Nat. 1952 : **86** : 23–32.

Extrinsic and intrinsic mechanisms isolating species are discussed and a classification of such mechanisms is presented with a view to eliminating some of the confusions of the terms in the literature. Comments are made on the significance of natural hybridization in the taxonomical study of *Gasteria* and *Aloe* and in the analysis of the isolating mechanisms normally operative in these and other genera.

1600. SIMPSON, G. G.
The species concept.
Evolution, Lancaster, Pa. 1951 : **5** : 285–98.

A general discussion is given of the species concept from the following aspects: semantics; a comparison of the typological, morphological and genetical concepts; the genetical definition of a species in relation to the evolutionary unit involved; differences between paleontological and neontological data; and the taxonomic and phyletic problems arising out of discontinuities and successions in paleontological samples.

1601. MATHON, C. -C.
Note pour attirer l'attention sur le déterminisme écologique de quelques transformations variétales et spécifiques.
(A note to draw attention to the ecological determination of some changes of form in varieties and species).
Riv. Ecol. 1952 : **2**: 87–102.

In the writer's opinion, research on plant geography and especially historical studies, is frequently hampered by the preconception of the preservation of specific and varietal forms unchanged, and he asserts that sudden changes do in fact occur, affecting the form of species and of genera. Such changes it is believed, could well be used to solve some fundamental problems of plant geography and population studies. Environment and hybridization are instanced as two factors responsible for sudden changes in plant forms.

1602. STEBBINS, G. L. (JUN.)
Aridity as a stimulus to plant evolution.
Amer. Nat. 1952 : **86** : 33–44.

It is argued that where moisture is a limiting factor, xerophytic plant communities contain fewer species than communities in mesophytic regions, but that the number of xerophytic communities per unit area is likely to be higher, since local diversity in topography, soil and other factors exerts a much greater effect on the nature of the vegetation in regions of inadequate moisture. This regional diversity has the effect

of promoting relatively rapid speciation. Evidence that certain mesophytic types have been derived from xerophytic ancestors is presented for the genera *Scorzonera* and *Tragopogon* in the tribe Cichorieae of the Compositae and for some genera of the subfamilies Mimosoideae and Caesalpinoideae of the Leguminosae.

*CYTOLOGY

1603. YASUI, K. and FUJII, K.
On the mechanism of nuclear division and chromosome arrangement. (A symposium). V. On the cell constituents and cell division with special reference to the staining reactions in buffer solution at pH 1.2 to 8.0.
Cytologia, Tokyo 1951 : **16** : 131–52.
Analyses on meiosis and mitosis in *Fritillaria verticillata, Lilium longiflorum, Vicia Faba* and other plants are reported, in which a comparison is made between the results obtained by Feulgen staining and the staining methods of Heidenhain and Naylor, using buffer solutions of various pH values. The nature and behaviour of the chromonema, hyalonema, nucleolus, attractoplasm and other cell components are discussed in terms of chemical structure and electric charges.

1604. CUTTER, V. M. (JUN.), WILSON, K. S. and DUBÉ, G. R.
The isolation of living nuclei from the endosperm of *Cocos nucifera*.
Science 1952 : **115** : 58–59.
A method of isolating living nuclei from the endosperm of the coconut and other material is described.

1605. DELAY, C.
Répartition des différentes structures nucléaires chez les dicotylédones. (**Distribution of the different types of nuclear structure among the dicotyledons**).
C.R. Acad. Sci. Paris 1944 : **219** : 95–97.
A synopsis is given of the taxonomic distribution of the four types of resting nucleus recognized by the authoress. Semireticulate nuclei were encountered most frequently (42% of the genera studied), followed by nonreticulate nuclei (35%). Woody species tend to have less chromatin than herbaceous.

1606. MALVESIN-FABRE, G.
Relations entre l'état de division de la chromatine et l'intensité du métabolisme cellulaire. (**Relations between the state of division of the chromatin and the intensity of cellular metabolism**).
C.R. Acad. Sci. Paris 1945 : **221** : 636–37.
It is reported that, in the species of the Araceae studied, the nuclear chromatin was more finely and uniformly dispersed in cells undergoing intense metabolic activity than in more quiescent tissues.

1607. DELAY, C.
Diagramme nucléaire des Aracées. (**Nuclear diagram of the Araceae**).
C.R. Acad. Sci. Paris 1946 : **222** : 1512–14.
A graphical representation is given to show the distribution of the various types of resting nuclei, classified according to chromocentre number and density of the reticulum, among the Araceae. The commonest type is the semireticulate nucleus.

1608. DELAY, C.
Structure nucléaire de *Datura Stramonium* L. (**Nuclear structure of *D. Stramonium* L.**).
C.R. Acad. Sci. Paris 1946 : **222** : 1407–08.
The structure of the resting nucleus is described. It comes under the semireticulate category and is noteworthy for the conservation of the structure of the individual chromosomes between mitoses.

1609. COOPER, D. C.
The transfer of desoxyribose nucleic acid from the tapetum to the microsporocytes at the onset of meiosis.
Genetics 1951 : **36** : p. 548. (Abst.).
Transference of globules of desoxyribose nucleic acid from the surfaces of tapetal nuclei to the developing microspores has been observed at Wisconsin University in eight species. Movement occurs when the leptotene stage of division has been reached; globules collecting between the microsporocytes have been observed in six additional species. The nucleus of each microsporocyte assumes a peripheral position and the chromosomal kinetochores aggregate at the nuclear membrane adjacent to that part of the cell wall outside which the globules are situated.

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* General studies, see also individual crops.

As the nucleic acid moves inward, the chromosomes become larger in diameter and more deeply stained. Before meiosis proceeds the nucleus of each microsporocyte resumes a central position.

1610. WALTERS, J. L.
Heteromorphic chromosome pairs in *Paeonia californica.*
Amer. J. Bot. 1952 : **39** : 145–51.
Two heteromorphic chromosome pairs, one having widespread occurrence and the other found only in a single plant, are described and compared with heteromorphic pairs reported in *Drosophila* and other organisms. Possible modes of origin of heteromorphic pairs are discussed. The most probable mode of origin of the pairs found by the author in *P. californica* is thought to be by means of pericentric inversions. The widespread occurrence of one pair over nearly half the total geographical range of the species and the variety of homozygotes derived from this pair suggest that it possesses a selective advantage.

1611. REESE, G.
Ergänzende Mitteilungen über die Chromosomenzahlen mitteleuropäischer Gefässpflanzen. I. (**Supplementary notes on the chromosome numbers of vascular plants of Central Europe. I**).
Ber. dtsch. bot. Ges. 1952 : **64** : 240–55.
By the end of 1949 the chromosome numbers of 73% of the vascular plants of Central Europe were known (cf. *Plant Breeding Abstracts*, Vol. XXI, p. 224). To this list, the present author adds 40 species, for some of which the chromosome number was not known before; in other cases the number given differs from that previously recorded. The species cited include *Juniperus sabina*, *Trifolium pratense* subsp. *rivale*, *Lepidium sativum*, *Melissa officinalis*, *Agrostis alpina* and *A. rupestris*.

1612. GILES, N. H. (JUN.), BEATTY, A. V. and RILEY, H. P.
The relation between the effects of temperature and of oxygen on the frequency of X-ray-induced chromosome aberrations in *Tradescantia* microspores.
Genetics 1951 : **36** : 552–53. (Abst.).
Although a high frequency of X-ray-induced chromosomal aberrations is induced by oxygen treatment, the increased solubility of oxygen at low temperatures is not wholly responsible for the high frequency of aberrations observed after exposure to low temperatures. A considerable additional effect due to temperatures alone was observed in an atmosphere of nitrogen; contrary to expectations the frequency of aberrations increased with rising temperatures.

1613. KIRBY-SMITH, J. S.
Effects of infrared irradiation on the frequency of X- and gamma-ray-induced chromosomal aberrations in *Tradescantia* pollen tubes.
Genetics 1951 : **36** : 558–59. (Abst.).
No significant difference has been observed in the aberration frequencies of material treated with X rays or γ rays alone and material exposed to near infrared radiation either before or after X irradiation or γ irradiation.

1614. SWANSON, C. P. and YOST, H. T. (JUN.).
The action of infrared radiation on the chromosomes of *Tradescantia.*
Genetics 1951 : **36** : p. 579. (Abst.).
It is suggested that the mechanism by which infrared irradiation, in conjunction with X ray treatment, increases the number of primary breakages and consequently produces a high aberration frequency (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2355) depends on creating a metastable condition among chromosomal molecules. Infrared treatment failed to raise the frequency of X-ray-induced mutations in *Tradescantia* buds when heat shocks (48° C for 30 sec.), sufficient to return molecules in a metastable state to their original condition, were interposed between infrared irradiation and exposure to X rays. It is assumed that the metastable state, induced by infrared treatment, enables chromosomes to react more readily with free radicals released by subsequent ionization. The fact that heat shocks also reduce the influence of infrared radiation given as a posttreatment to X irradiation suggests that X rays induce "incipient breaks, metastable states of a high relative capacity, or some other category of change" which become primary breaks when exposed to infrared radiation; heat shocks effectively eliminate such loci and subsequent doses of infrared no longer affect them.

1615. RILEY, H. P., GILES, N. H. (JUN.) and BEATTY, A. V.
The oxygen effect of X-ray-induced chromatid aberrations in *Tradescantia* microspores.
Genetics 1951 : 36 : 572–73. (Abst.).
A linear relationship between aberration frequency and dosage was obtained for both

isochromatid and chromatid aberrations in the presence of oxygen and in an atmosphere of helium; aberration frequencies were higher in oxygen, the magnitude of difference being much greater for isochromatids than for chromatids (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1396). Different intensities of radiation had no effect on the frequencies of aberrations, but chromatid exchanges became less frequent at low intensities. Results suggest that the average restitution time for broken ends is unaffected by oxygen, indicating that oxygen influences the initial breakage frequency.

1616 Conger, A.D. and Fairchild, L. M.
The induction of chromosomal aberrations by oxygen.
Genetics 1951 : **36** : 547–48. (Abst.).

Chromosomal aberrations observed in cultures of germinating *Tradescantia* pollen grains, after treating the dry pollen with oxygen of 99·5% purity, were of the frequency and type produced by X ray dosages of 600 r. in air. Exposure to γ rays of only 2 r. following oxygen treatment induced a degree of fragmentation resembling that caused by γ rays of 1000 r. in air.

1617 Brown, S. W.
Activity of the nucleolus-organizer of *Luzula campestris* in relation to internal nucleolar structure.
Genetics 1951 : **36** : 543–44. (Abst.).

A distinctive terminal chromomere, identifiable among the six bivalents of *L. campestris* at pachytene, is constantly associated with the nucleolus. Granules originate from this chromomere and migrate towards the centre of the nucleolus where they cluster together and ultimately induce the formation of vacuoles. Minor physiological changes influence the behaviour of the chromomere and consequently give rise to variations in nucleolar structure.

1618 Ėllengorn, Ja. E., Gluščenko, I. E. and Afanasjeva, A. S.
(Some questions on the origin of the plant cell).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1951 : No. 5 : 12–34. [Russian].

Recent cytological literature is reviewed in the light of investigations by Lepešinskaja (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1509). Studies were made of amitotic reproduction in the cells of the petioles of *Hedera helix* and in excised cubes of potato tubers. In both instances, the new cells were produced by processes differing from normal mitosis and described by the authors as "cicatrization." Some new cells had no nuclei. The view that every division of cells and nuclei is mitotic is contested.

1619. Ėllengorn, Ja. E. and Žironkin, I. M.
(The reproduction of cells and ontogenesis of nuclei during the process of root development from the lenticels of black currant and willow cuttings).
Izv. Akad. Nauk, SSSR (News Acad. Sci. USSR) Ser. Biol. 1951 : No. 5 : 35–45. [Russian].

Cuttings of willow and black currant, when submerged for some time in water, produce roots from the lenticels. It was observed that the roots developed from actively dividing cells in the tissues below the lenticels. These cells had no nuclei and multiplied by so-called "cicatrization" (cf. Abst. 1618). At a later stage in the development of the roots, protonuclei appeared, which were more simply organized than normal nuclei and resembled the nuclei occurring in many protozoa. The protonuclei later disintegrated into fragments, each of which gave a new protonucleus.

1620. Inoué, S.
Regulation of the submicroscopic organization of the mitotic spindle.
Science 1951 : **114** : p. 685. (Abst.).

The structure of the spindle in living and functional cells has been studied in the pollen mother cells of *Lilium longiflorum* and other material by an improved polarization microscope. The observed distribution of birefringence within the spindle could not be explained on the basis of the tactoid and line of flow hypotheses. Probably the spindle is a special type of gel structure composed of elongated and orientated micelles, linked by fairly labile bonds.

1621. Rylska, T.
Badania nad mechanizmen działania czynników mitotycznych. **(Studies on the mechanism of the action of mitotic agents).**
Ann. Univ. Mariae Curie-Skłodowska Lublin-Polonia 1951 : Sect. C : **5** : 321–34.

Using the race Duoro-Muskatello of *Saccharomyces elipsoideus*, 29 experiments were made to investigate the influence of colchicine on the mitogenetic radiation of yeast. Results showed that over a wide range of concentrations, colchicine had no effect on the mitogenetic radiation or budding of the yeast. In the cultures, however, to which colchicine had been

added, a greater number of abnormal, i.e., very large, bottle-shaped, cells, was seen than in the control cultures; from this the writer concludes that, whilst not inhibiting cell division in yeast, colchicine causes morphological and possibly genetic changes in the cells.

1622. Wilson, G. B. and Bowen, C. C.
Cytological effects of some more antibiotics.
J. Hered. 1951 : **42** : 251–55.

This continuation of research summarized in *Plant Breeding Abstracts*, Vol. XXI, Abst. 1558 deals with the effects of aureomycin, terramycin, streptomycin and chloromycetin on *Allium* root tips. All four chemicals induce mitotic aberrations similar to those generally termed c-mitosis. Recovery is rare except after treatment with chloromycetin. The latter merely suppresses division so that recovered cells appear normal. As yet none of these drugs has induced polyploidy; a low percentage of reductional groupings, capable of producing haploid tissues, has been recorded, but it is doubtful whether this was higher than in controls.

1623. Geitler, L.
Über angebliche Meiosen in somatischen Geweben. **(On alleged meiosis in somatic tissues).**
Öst. Bot. Z. 1952 : **99** : 161–63.

Having discussed Battaglia's five classes of "meiosis" in somatic tissues (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1548), the author concludes that somatic meiosis does not occur in either plants or animals.

1624. Maeda, T.
(Studies on chiasmata).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 64–69. [Japanese].

This review covers the history of investigations on chiasmata up to and including the latest Japanese researches.

1625. Bergman, B. T.
Asyndesis in macrosporogenesis of diploid, triploid and tetraploid *Chrysanthemum carinatum*.
Hereditas, Lund 1952 : **38** : 83–90.

Meiosis was found to be normal in the pollen mother cells of plants with chromosome numbers of $2n = 18$, 26, 29, 36 and 37. Total asyndesis however occurred in 19·0, 41·9, 20, 20·3 and 70% of the egg mother cells of these plants, respectively.
Degeneration in the asyndetic cells set in soon after anaphase; no restitution nuclei were observed. This asyndesis is probably genetically determined.

1626. Deysson, G.
Sur les actions mitodépressive, mitostatique et mitoclasique. **(On mitodepressive, mitostatic and mitoclasic actions).**
Bull. Soc. Bot. Fr. 1951 : **98** : 258–60.

The confusion in the terminology applied to the effects of various toxic substances on mitosis is deplored with reference to the use of the above three words.

1627. Fabergé, A. C. and Mohler, J. D.
Breakage of chromosomes produced by ultraviolet radiation in *Drosophila*.
Nature, Lond. 1952 : **169** : 279–79.

Experiments with *Drosophila* and also maize indicate that ultraviolet radiation induces a very high frequency of chromosome breaks followed by a restitution of very high proportion. This accounts for the low frequency of aberrations induced by ultraviolet radiation, in contrast to the frequencies obtained by treatment with ionizing radiations and to a lesser degree with the mustard group of chemicals. It is thought that these observations on the very high frequencies of breakage and of subsequent restitution will be found to be characteristic of the genetic effects of ultraviolet radiation in general.

1628. Sparrow, A. H.
Some cytological and morphological changes induced in plants by ionizing radiation.
Science 1951 : **114** : p. 488. (Abst.).

Data on chromosomal aberrations in *Tradescantia paludosa* indicate that chromosomes in cells undergoing meiosis are much more sensitive to radiation than chromosomes in somatic cells. Dosages which caused marked morphological changes also produced a considerable number of chromosomal irregularities. Most of the morphological changes were, however, apparently physiological and not genetic in origin, but the possibility that they were in some way related to chromosomal aberrations cannot yet be excluded.

1629. Giles, N. H. (Jun.) and Conger, A. D.
Chromosomal interchanges induced in *Tradescantia* microspores by fast neutrons from uranium fission.
J. Cell. Comp. Physiol. 1950 : **35** : Suppl. 1 : 83–88.

Analyses of the number of dicentrics and centric rings induced by exposure to fast neutrons from the uranium fission pile at the Oak Ridge National Laboratory, Tenn., indicate a linear

relationship between neutron dose and frequency of chromosomal interchange. This result confirms previous observations using cyclotron neutrons (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 130). Further evidence was obtained of the inverse relationship between the efficiency of fast neutrons in causing chromosomal interchanges and the energy of the neutrons; the less energetic uranium neutrons are more efficient in this respect than cyclotron neutrons. It is therefore assumed that several ionizations are required to produce a chromosome break in *Tradescantia*.
Ratios of dicentrics to centric rings indicate that the nonrandom recombination of broken ends is favoured as neutron energy decreases.

1630. MULLER, H. J. and VALENCIA, J. L.
The localization of the mutagenic action of neutron-induced ionizations in *Drosophila*.
Genetics 1951 : **36** : 567–68. (Abst.).
Linear relationships observed between neutron dosage and the frequency of translocations induced in *Drosophila* spermatozoa by fast neutrons indicate that broken chromosome ends arising from several breaks caused by the same ionization track recombine more often than ends broken by different tracks. Breaks caused by the same ionization track tend to occur in close proximity and the sections may reunite without any great change of position.

1631. DEYSSON, G.
Sur l'action mitoclasique du phényluréthane. (**On the c-mitotic action of phenylurethane**).
C.R. Acad. Sci. Paris 1944 : **219** : 366–68.
The c-mitotic effect of phenylurethane on *Allium Cepa* roots was compared with that of colchicine. Though similar in many respects, significant differences between the two reagents in their c-mitotic effects were noted; in particular, phenylurethane induced a higher frequency of hemicineses and nuclear aberrations.

1632. DEYSSON, G.
Action simultanée du phényluréthane et de la colchicine sur les méristèmes radiculaires d'*Allium Cepa* L. (**Simultaneous action of phenylurethane and colchicine on the root meristems of *A. Cepa* L.**).
C.R. Acad. Sci. Paris 1945 : **220** : 367–69.
The toxic effect of phenylurethane is either unaffected or diminished by admixture with colchicine. Tumour formation is accelerated by the mixture. Compared with colchicine alone, the mixture reduces the frequency of cell division but increases the number of stathmocineses. These results are explained on the assumption that colchicine has a marked c-mitotic action but a feeble mitodepressive effect, while phenylurethane acts as a c-mitotic and as a mitodepressive agent.

1633. DEYSSON, G.
Tuméfaction des racines et mito-inhibition sous l'influence du camphre. (**Tumefaction of the roots and mitotic inhibition under the influence of camphor**).
C.R. Acad. Sci. Paris 1945 : **221** : 568–70.
While the optimum concentration at which camphor exerts a c-mitotic action on *Allium Cepa* is 0·02–0·03%, the optimum concentration for tumefaction is 0·012–0·015%. These findings suggest that c-mitosis and tumour induction are independent processes.

1634. MARTIN, G.
Action de la colchicine sur les tissus de topinambour cultivés in *vitro*. (**Action of colchicine on sunflower tissue cultures**).
C.R. Acad. Sci. Paris 1944 : **219** : 191–92.
In the absence of heteroauxin, colchicine is without effect on tissue cultures of the sunflower. If heteroauxin is present, low concentrations of colchicine increase the rate of proliferation, but high concentrations are inhibitory.

1635. DEYSSON, G.
Sensibilisation des tissus végétaux à l'action de la colchicine sous l'influence de l'ether et du chloroforme. (**Sensitization of plant tissues to the action of colchicine through the action of ether and chloroform**).
C.R. Acad. Sci. Paris 1944 : **219** : 289–91.
The addition of either ether or chloroform increased the c-mitotic activity of colchicine on *Allium Cepa* roots.

1636. FRANCINI, E.
Il valore scientifico e pratico dei poliploidi. (**The scientific and practical value of polyploids**).
Ann. Fac. Agrar. Univ. Bari 1942 : **2** : 57–77.
A review is given of the occurrence of polyploidy in numerous crop plants and fruits, with indications of the economic value of such forms.

1637. Darmer, G.
Der Gigas-Charakter von Kulturpflanzen und das Verhalten polyploider Wildformen. (**The *gigas* character in cultivated plants and the behaviour of polyploid wild forms**).
Züchter 1951 : **21** : 301–05.

A population of *Hippophae* growing on the Hiddensee island in Germany contained large, medium and small individuals. Histological studies showed the cell size to be greater and the number of stomata less in the large form, which chromosome counts revealed to be tetraploid with $2n = 24$, the small form being diploid with $2n = 12$. The diploid forms were in the majority in the favourable habitats, the tetraploids being predominant in the more extreme, saline conditions of the alluvial plains. The tetraploids were less fertile but their seeds were larger and germinated more vigorously. Cases are also cited in which *gigas* forms with increased cell size have arisen without change in chromosome number.

1638. Galan [Galán], F.
Sur la génétique de la monoecie et la dioecie zygotique chez *Ecballium elatherium* Rich. (**On the genetics of zygotic monecy and diecy in *E. elatherium* Rich**).
C.R. Acad. Sci. Paris 1946 : **222** : 1130–31.

The substance of this article has been summarized in *Plant Breeding Abstracts*, Vol. XIX, Abst. 2384.

1639. Rizet, G.
Sur le comportement des hétérochromosomes à la méiose, chez les mâles tétraploïdes de *Melandrium album*. (**On the behaviour of the heterochromosomes of tetraploid males of *M. album* at meiosis**).
C.R. Acad. Sci. Paris 1945 : **220** : 222–24.

The frequency of XX, XY and YY pollen grains was studied in colchicine-induced tetraploid material. The number of XX and YY grains was greater than expected for a random distribution, presumably because fully homologous chromosomes pair more readily with each other than X with Y chromosomes.

1640. van Iterson, W.
De betekenis van de electronen-microscoop voor de bioloog. (**The significance of the electron microscope for the biologist**).
Vakbl. Biol. 1952 : **32** : 3–20.

The advantages and limitations of the new technique are discussed. Examples are given of new light it has shed on the structure of bacterial flagella, fibrillar proteins, cellulose microfibrils, virus particles and bacteriophage.

1641. Zimmermann, K.
Zwillingsauslese als Möglichkeit zur Züchtung von Fremdbefruchtern. (**Selection of twins as a possible method of breeding cross-fertilized plants**).
Züchter 1951 : **21** : 253–55.

The possibility of diploidizing haploid twin plants occurring in Petkus winter rye, lucerne and Criewener fodder beet was investigated. One haploid twin plant of rye treated with colchicine became tetraploid and subsequently withstood — 11° C of frost during vernalization. In lucerne, seeds containing twin embryos were found to be larger than those with single embryos. Cytological examination of the twin plants found has still to be made. The work on beets is still in its initial stage.

1642. Weier, T. E. and Stocking, C. R.
The chloroplast: structure, inheritance, and enzymology. II.
Bot. Rev. 1952 : **18** : 14–75.

Concepts of plastid inheritance are among the topics reviewed.

1643. Harada, I.
(**The caryotype and mode of development of the thread-like pollen of the genus *Zostera***).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 13–14. [Japanese].

The chromosome complement of five species of *Zostera* is described. During microsporogenesis, cell division occurs parallel to the long axis of the pollen mother cell to form four parallel thread like cells. Chromosome behaviour is normal.

*DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

1644. Lamprecht, H.
Växtsjukdomar och växtförädling. (**Plant diseases and plant breeding**).
Weibulls Allehanda 1945 : **5** : No. 3 : 7–9.

The various types of pathological conditions in plants are defined and the role of plant breeding in the control of diseases due to fungi or insect pests is discussed, with observations on the need to combine resistance with other valuable economic characters and on the importance of artificial infection in breeding resistant plants.

* General studies, see also individual crops.

1645. Lieb, M.
Forward and reverse mutation in a histidine-requiring strain of *Escherichia coli.*
Genetics 1951 : **36** : 460–77.

The rates at which a histidine requiring (h^-) strain, 148–334, mutates spontaneously to histidine independence (h^+) and conversely from h^+ to h^- are respectively $2{\cdot}9 \times 10^{-8}$ and $1{\cdot}2 \times 10^{-6}$ per bacterium per division cycle. Subsequent exposure to equivalent doses of ultraviolet radiation increased both mutation rates by the same factor, so that the relative mutability of h^+ and h^- was unaltered.

These results, in conjunction with data concerning comparative rates of spontaneous and ultraviolet-induced mutations in respect of resistance of strain B of *E. coli* to streptomycin (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1454), suggest that, in *E. coli*, the relative spontaneous mutability of a character is an indication of its ability to mutate when irradiated with ultraviolet light.

1646. Newcombe, H. B.
Sectoring in colonies from irradiated cells of *Escherichia coli.*
Genetics 1951 : **36** : p. 570. (Abst.).

Cells of *E. coli* irradiated by ultraviolet light of 500 to 1,000 ergs per sq. mm. and by γ rays of 40,000 to 80,000 r. produced colonies of which 15–20% and 6–7% respectively had coloured sectors. Assuming the presence of more than one nucleus in the treated cells, attempts were made to eliminate sectoring by selecting the descendants from a single nucleus, using phages T1 and T5 and streptomycin as selective agents; the proportion of sectored colonies was approximately half that previously observed. It is suggested that sectoring which survives selection may be due to delayed mutation, genetic interchange between two nuclei in the treated cell, mutation in incompletely split chromosomes or mutation in hereditary particles other than chromosomal genes.

1647. Norman, A. and Greenfield, M. A.
Lethal mutations and the bactericidal action of ionizing radiation.
Naturwissenschaften 1952 : **39** : p. 22.

Huber's theory that the bactericidal action of radiation can be interpreted in terms of the induction of lethal mutations is criticized on the basis that vegetative cells of *E. coli* are multinucleate. It is unlikely that recessive lethal mutations would be induced at identical loci in each nucleus by a single ionizing particle. If it is assumed that a dominant lethal mutation is induced by the radiation, cells which divide one or more times after irradiation should produce offspring segregating for this character; all daughter cells are, however, inactivated.

1648. Maccacaro, G. A. and Booth, C. P.
Frequency of recombination in *E. coli* K 12.
Nature, Lond. 1952 : **169** : 196–97.

According to the technique devised by Lederberg (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 761), a cross between two bacterial strains differing in growth factor deficiencies is carried out by mixing on "minimal medium" suspensions of young cultures of the two strains, which have been washed by centrifuging twice in saline. Using strains of *Escherichia coli*, the authors have observed that if crosses are instead made between the first supernatant liquids normally thrown away, the ratio of prototrophs to parental cells is many times greater than that obtained by employing Lederberg's technique. In general the data support the hypothesis that the supernatant liquid contains sufficient growth factors, derived from the medium on which the parent cells were cultured, to allow some growth of the recombining or prototrophic cells, so that the high frequency of recombination is apparent rather than real.

1649. Witkin, E. M.
Nuclear segregation and delayed expression of induced mutations in *Escherichia coli.*
Genetics 1951 : **36** : p. 583. (Abst.).

At different cultural stages, populations of strains B and B/r consist of different ratios of uninucleate and multinucleate cells; these ratios proved to be correlated with ratios of intact to sectored lactose-negative mutant colonies obtained on an eosin-methylene blue medium after ultraviolet irradiation. Sectoring therefore appears to result from nuclear segregation in heterocaryotic cells.

Data from ultraviolet irradiated cultures subjected to the selective action of bacteriophage T1 and streptomycin (cf. Abst. 1646) show that sectors arise among phage resistant and streptomycin independent mutants, presumably derived respectively from single nuclei, by mechanisms other than nuclear segregation. Suggested explanations for sectoring in the above conditions comprise "segregation of extranuclear particulate units, delayed mutation or genetic exchange between nuclei, chromosomes or strands."

1650. HAYES, W.
Recombination in *Bact. coli* K 12: unidirectional transfer of genetic material.
Nature, Lond. 1952 : **169** : 118–19.
Data on recombination, as indicated by prototroph formation, in mixtures of strains cultured under various conditions have led to the hypothesis that in the case of the mixture of *W* 677/S^t, a biochemical mutant sensitive to streptomycin, and another biochemical mutant resistant to streptomycin, 58–161/S^r, a one-way transfer of genetic material, extruded from 58–161/S^r and incorporated into *W* 677/S^t, occurred. This transfer, it is suggested, could have been effected through the agency of a symbiotic virus.

1651. FINNEY, D. J. and MARTIN, L.
A re-examination of Rahn's data on the number of genes in bacteria.
Biometrics 1951 : **7** : 133–44.
In this analysis of Rahn's theory that mitosis occurs after all the genes in a cell have doubled, and of his data on the growth rate of *Bacterium aerogenes*, the authors calculate that the number of genes in this organism should be *ca.* 26. This low estimate throws some doubt on the theoretical assumptions used.

1652. BOIVIN, A., DELAUNAY, A., VENDRELY, R. and LEHOULT, Y.
Sur les modalités des interactions bactériennes: effets antagonistes et inductions de transformations dans les propriétés des germes. (**On the modes of bacterial interaction: antagonism and the induction of the transformations in microbial properties**).
C.R. Acad. Sci. Paris 1945 : **221** : 718–19.
During the course of a discussion on the types of interaction between strains of colon bacilli, it is noted that prolonged contact with the products of fermentation of the substrate may effect transformation of microbial type without the action of a nucleic acid (cf. Abst. 1653).

1653. BOIVIN, A., VENDRELY, R. and LEHOULT, Y.
L'acide thymonucléique hautement polymérisé, principe capable de conditionner la spécificité sérologique et l'équipement enzymatique des bactéries. (**Highly polymerized thymonucleic acid, an agent capable of conditioning the serological specificity and enzyme equipment of bacteria**).
C.R. Acad. Sci. Paris 1945 : **221** : 646–48.
Changes in the morphology, serological reaction and enzyme complement of colon bacilli have been induced by treatment with extracts from cultures from other strains. The active principle was a highly polymerized thymonucleic acid.

1654. SCHULDT, E. and GOTTLIEB, D.
Colchicine as a mutagenic agent for *Streptomyces griseus*.
Trans. Ill. Acad. Sci. 1950 : **43** : 51–52.
None of the changes in colony morphology resulting from colchicine treatment proved to be stable; with subsequent transfer all the variants reverted to the normal form. Attempts to induce physiological variants differing in streptomycin production were unsuccessful; in this respect colchicine appears therefore to be a less favourable agent than X rays or ultraviolet light.

1655. BELLINI, C. C.
A preliminary investigation of mutation production in *Sarcina lutea* Schroeter.
J. Hered. 1951 : **42** : 379–84.
Culturing of *S. lutea* with other bacterial species or mixtures of species resulted in an increased rate of frequency of a nonpigmented mutant, compared with its spontaneous occurrence in pure cultures. The mutants obtained by the various methods of culturing were indistinguishable from one another and from the spontaneous mutants. No reverse mutation occurred.

1656. RUBIN, B.A.
The relation of nucleic acid metabolism to the genetic effect of radiation in bacteria.
Genetics 1951 : **36** : 573–74. (Abst.).
Levels of continuous radiation by X rays or β rays which prove lethal to resting cells of *E. coli* B/r permit the growth of metabolizing organisms. After being irradiated for 14 generations the mutation rate is affected by the radiation dose but not by the number of genetic reduplications; changes in nucleic acid metabolism are related to the extent of synthesis that has occurred during the irradiation.

1657. COSSLETT, V. E.
The application of electron microscopy in cytology.
Chem. Ind., Lond. 1952 : No. 2 : 29–34.
An estimation is given of the value of electron microscopy, with a discussion on the occurrence of artefacts and the interpretation of micrographs. Reference is made to a few recent cytological investigations including the nature of bacterial nuclei (cf. Abst. 111).

1658. DeLamater, E. D.
Preliminary observation on the occurrence of a typical mitotic process in Micrococci.
Bull. Torrey Bot. Cl. 1952 : **79** : 1–5.
By means of a freezing dehydration technique typical mitosis has been observed in several forms of bacteria (cf. Abst. 115). The present paper describes evidence of true mitosis in *M. chryophilus*.

1659. Bisset, K. A. and DeLamater, E. D.
Spurious mitotic spindles and fusion tubes in bacteria.
Nature, Lond. 1952 : **169** : 247–48.
Bisset criticizes the claim by DeLamater and his colleagues that typical mitosis and fusion tubes occur in bacteria (cf. Absts. 940 and 1658), on the grounds that these interpretations are based upon unfamiliarity with the behaviour of the bacterial cell wall. DeLamater contributes a detailed defence of the conclusions reached by himself and his fellow-workers.

1660. Hughes, W. H.
Variation in penicillin resistance in single-cell cultures of *Staphylococcus* aureus.
J. Gen. Microbiol. 1952 : **6** : 175–80.
Single cells, isolated at various stages of selection on penicillin media, gave rise to populations differing considerably from the parent in sensitivity to penicillin. The range of variation was approximately the same for the different stages of selection. Variation appeared to be continuous in any one population. The difficulties of applying the term mutation to this type of variation and of explaining it in terms of Mendelian principles are discussed.

1661. Demerec, M.
Studies of the streptomycin-resistance system of mutations in *E. coli*.
Genetics 1951 : **36** : 585–97.
A radiation-resistant mutant of strain, B B/r, was used for the experiments. For the sake of convenience this mutant is designated B in the present paper. The spontaneous rate of mutation of B from streptomycin sensitivity to complete resistance was approximately 1×10^{-9} per bacterium per division. About 60% of the resistant mutants were dependent on streptomycin. The rate of spontaneous back mutation of a streptomycin dependent strain (B/Sd–4) to nondependence proved to be $1{\cdot}4 \times 10^{-8}$ per bacterium per division (cf. Abst. 1662). Ultraviolet light and X rays are both effective in inducing mutation from B to B/S (streptomycin resistance) and back mutation of B/Sd–4 to nondependence. For both radiations the relationship between dose and mutation rate is represented by a straight line. This result contrasts with the multiple-hit curve obtained for the relationship between ultraviolet dose and mutation rate in the phage resistance system (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1458). No evidence of the occurrence of zero-point mutants in the streptomycin resistance system was secured.

1662. Bertani, G.
A method for detection of mutations, using streptomycin dependence in *Escherichia coli*.
Genetics 1951 : **36** : 598–611.
During residual growth of streptomycin-dependent mutant strains on agar containing no streptomycin, nondependent back-mutants either sensitive or resistant to streptomycin have an opportunity to form colonies. This phenomenon provides the basis of a valuable technique of investigating mutation. Factors affecting the results secured by this technique and which must therefore be controlled in quantitative studies are analysed. The method permits scoring of cells undergoing mutation from streptomycin dependence to nondependence with as a low a frequency as 1 in 10^8 cells plated. Increases in mutation rate induced by chemical or physical agents can be easily detected.

1663. Braun, W. and Goodlow, R. J.
The role of amino acids in bacterial population changes.
Genetics 1951 : **36** : p. 542. (Abst.).
Further studies concerning population changes in cultures of *Brucella* are reported (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1617); they include the effect of differences between mutants, in respect of metabolite production and degree of resistance to accumulating metabolites, on population equilibria. Results are correlated with observations on modified virulence, resistance and susceptibility in *Salmonella* cultures.

1664. Krasiljnikov, N. A.
(**Does intraspecific antagonism exist between microorganisms**?). [Abst.].
Priroda (Nature) 1951 : No. 7 : 59–60. [Russian].
Experiments with various bacterial species and other microorganisms suggest that antibiotic substances produced by one strain of a species have no toxic effect upon other strains of the same species.

1665. Lederberg, E. M.
Lysogenicity in *E. coli* K-12.
Genetics 1951 : **36** : p. 560. (Abst.).
Reactions of two strains of *E. coli*, K–12 and W–518, to virus λ-2 have been investigated; the latter, probably a mutant of λ, was isolated following ultraviolet treatment of a lysogenic culture. A high incidence of resistance to λ-2 was found among lysogenic strains of K–12; this resistance may have accumulated by a high rate of spontaneous mutation among sensitive bacteria, or by the selective advantage of resistant bacteria in the presence of λ-2.

1666. Kozloff, L. M.
Biochemical studies of virus reproduction. VI. The breakdown of bacteriophage T_6r^+. VII. The appearance of parent nitrogen and phosphorus in the progeny.
J. Biol. Chem. 1952 : **194** : 83–93; 95–108.
Labelled N and P have been used to trace the breakdown of virus proteins and nucleic acid after phage T_6r^+ infects *Escherichia coli*. Degradation products of the virus are used in the synthesis of nucleoproteins for subsequent progenies of the original bacteriophage. Inactivation of genetic material in the parent phage by irradiation with ultraviolet light or X rays has no effect on the contribution of N and P to the virus progenies.

1667. Lieb, M.
Studies of a bacteriophage carried by *Escherichia coli*, strain K 12.
Genetics 1951 : **36** : p. 562. (Abst.).
The nonlysogenic substrain of K–12, designated Sens, proved sensitive to λ particles liberated by K–12 after ultraviolet irradiation. The proportion of resistant and susceptible individuals in a Sens culture varies. In a predominantly sensitive culture the resistant cells are prelysogenic, giving rise to cultures indistinguishable from the original lysogenic K–12 after brief exposure to λ; there are, however, few such cells in a predominantly resistant culture. An increase in the number of sensitive cells occurs in all cultures following treatment with ultraviolet radiation; this suggests that prelysogenic cells can be converted into lysogenic individuals before infection with λ.

1668. Puck, T. T.
The nature of virus-host specificity.
Science 1951 : **114** : p. 685. (Abst.).
The first step in the invasion of bacterial host cells by T phages is an attachment reaction that is completely reversible. Data have been obtained suggesting that initial attachment consists in the establishment of electrostatic bonds between ion groups on the surface of the two particles involved. The second step is an irreversible reaction, considerably dependent upon the temperature, that can be inactivated by various agents; this step appears to be an enzymatic transformation affecting a vital cell constituent. Ability of the bacterial cell to resist invasion by a specific virus is a genetic character and can be due to failure of either the first or second reaction. Mutants showing either type of resistance have been isolated. It is postulated that a resistant mutant cell differs from the wild type in the distribution of the ion groupings on its surface so that the virus is confronted with a noncomplementary electrostatic configuration.

1669. Gezelius, K. and Fries, N.
Phage resistant mutants induced in *Escherichia coli* by caffeine.
Hereditas, Lund 1952 : **38** : 112–14. (Abst.).
Zero point mutants possessing phage resistance were induced by treatment with a 2% solution of caffeine.

1670. Wikberg, E. and Fries, N.
Some new and interesting biochemical mutations obtained in *Ophiostoma* by selective enrichment technique.
Physiol. Plantarum, Copenhagen 1952 : **5** : 130–34.
Biochemical mutants not previously recorded for *O. multiannulatum* have been induced by ultraviolet irradiation and isolated by culturing on a complete medium supplemented by liver extract. Mutants apparently dependent upon a single gene included one requiring glutathione and another a combination of adenine, histidine and glycine. Some of the mutants with more complex requirements were probably double mutations. Temperature-sensitive mutants were also obtained.

1671. Wilson, C. M.
Meiosis in *Allomyces*.
Bull. Torrey Bot. Cl. 1952 : **79** : 139–60.
In both the subgenera *Euallomyces* and *Cystogenes* of *Allomyces* meiosis occurs in the germinating thick-walled resistant sporangia. The life cycle of *Euallomyces* however consists of equal and alternating haploid gametophytes and diploid sporophytes, whereas *Cytogenes* is predominantly diploid with only one mitotic division of haploid nuclei in the entire life cycle.

In *Brachyallomyces* the nuclear divisions in the resistant sporangia are mitotic and the sexual phase is omitted from the life cycle. Meiosis in *Allomyces* follows the usual pattern found in most organisms. Certain aspects are however of interest, such as the late prophase stage at which nuclear division is arrested until germination begins, the intranuclear divisions and large nucleolus. The following haploid chromosome numbers are reported: *A. cystogenus*, 14; *A. arbuscula*, 16; and *A. javanicus* var. *macrogynus*, 28. Evidence of polyploidy in *A. arbuscula* and *A. javanicus* var. *macrogynus* has been obtained. The value of *Allomyces* for cytogenetical investigations is stressed.

1672. Sheng, T. C.
The genetic basis of woolly degeneration in *Neurospora crassa*.
Bot. Gaz. 1951 : **113** : 203–06.

Woolly degeneration, i.e. a gradual reduction in conidia formation with successive transfers of a culture, was found to be a general physiological character, which was intensified in the presence of a single gene designated *wd*.

1673. Norman, A.
Nuclear interactions in ultraviolet irradiated *Neurospora* conidia.
Genetics 1951 : **36** : 570–71. (Abst.).

The inactivation cross section per conidial nucleus is twice as large in uninucleate as in multinucleate conidia. This difference in cross section per nucleus can be attributed to the expression of recessive lethal mutations in uninucleate conidia, whereas in multinucleate conidia the frequency of recessive lethal mutations is not sufficiently high to contribute to nuclear inactivation which is therefore ascribed to some nongenetic process (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1469). Both genetic and nongenetic processes contribute to inactivation of the uninucleate conidia, and the effects of both are reversed to the same extent by photoreactivation. The production and expression of recessive lethal mutations are presumably suppressed by nuclear interaction in the multinucleate conidia.

1674. Weidel, W.
Genabhängige biosynthetische Reaktionsketten und ihre Analyse. (**Biosynthetic reaction chains depending on genes and the analysis of such chains**).
Naturwissenschaften 1952 : **39** : 55–62.

Beadle and Tatum's work on eye pigments in *Drosophila* is summarized, and that of Dodge, Lindegren and McClintock on *Neurospora crassa* (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 129; Vol. XVII, Absts. 618, 1540 and 1590 and Vol. XVIII, Abst. 122).

The discovery of a *Neurospora* mutant which fails to synthesize pantothenic acid, though containing the two necessary intermediate substances and the enzyme necessary for their union, suggests the possibility of a special type of genetic blocking of chains of chemical synthesis. Thus, in the "normal" case it is supposed that, as a result of the mutation of a certain gene, an enzyme directly dependent on this gene and catalysing a certain reaction in the synthesis is missing; but blocking might equally well occur, if, as a result of a gene not concerned in the blocked chain of synthesis, a substance is produced, or accumulates, which is capable of specifically inhibiting the action of the enzyme involved in the chain.

Analysis of chains of chemical synthesis controlled by single genes is not sufficient for elucidating the mode of production of typical morphological characteristics; it is probable that it is the exact timing of numerous chemical syntheses and also of various mechanical, osmotic and other processes, some proceeding simultaneously, others in sequence, which is responsible for distinctive morphological features.

1675. Harrold, C. E. and Fling, M.
Two mutants of *Neurospora crassa* which utilize formate or formaldehyde for growth.
J. Biol. Chem. 1952 : **194** : 399–406.

Two genetically distinct mutant strains, C–24 and T–3207, isolated from crosses between ultraviolet-irradiated macroconidia and untreated wild type protoperithecia, were found to require formate or formaldehyde. C–24 will grow poorly on adenine or adenine plus methionine, and T–3207 will grow on serine, but neither grows on any of 25 other aminoacids. Each strain differs from the wild type by a single nonallelic gene.

Cultures from ascospore isolates of T–3207 show reduced response to formate and serine, compared with the original mutant. Ascospore isolates from C–24 are quantitatively similar to the parent strain.

1676. Markert, C. L.
Comparative gene stability in *Glomerella* and *Neurospora*.
Genetics 1951 : **36** : p. 564. (Abst.).

Comparisions of 100 auxotrophic mutants of *Glomerella* have not revealed differences in the

qualitative mutagenic effects of ultraviolet light, X rays and fast neutrons. Ultraviolet-induced mutants revert to the wild type more frequently than those induced by X rays or fast neutrons. Mutations occurring most frequently in *Glomerella* are also found in similar relative proportions in radiation-induced auxotrophic mutants of *Neurospora*, indicating comparable stabilities between genes controlling homologous reactions in both fungi. Whereas *Neurospora* mutants are indistinguishable from the wild parent, all auxotrophic mutants of *Glomerella* are visibly different from the wild type, on a complete medium.

1677. HUNGATE, F. P. and MANNELL, T.
Sulfur-35 as a mutagenic agent.
Genetics 1951 : **36** : 555–56. (Abst.).

Over 10% biochemical mutants of *Neurospora crassa* were recovered from populations grown on Fries medium in which all the sulphur consisted of radioactive S^{35}. The number of mutants decreased as stable sulphur was substituted.

1678. GRIGG, G. W.
Back mutation assay method in micro-organisms.
Nature, Lond. 1952 : **169** : 98–100.

The assay method generally used to detect reverse mutants induced by radiation is criticized on the grounds of experimental evidence obtained by the author that conidia of the wild type of *Neurospora* are inhibited by various concentrations of the mutant strains. Thus platings of large numbers of mutant cells are useless as controls. Many mutagens are somewhat toxic and may appear to produce back mutants by relieving the inhibition in some way, e.g. by killing off proportions of the inhibiting mutant cells. Furthermore, if there were a floating population of wild type cells in the mutant culture, dilution of a conidial suspension of a mutant to a concentration less than the inhibitory one might allow colonies of the wild type to appear.

1679. TATUM, E. L.
Effects of radiation on fungi.
J. Cell. Comp. Physiol. 1950 : **35** : 119–31.

A survey of some of the more recent observations on mutations induced in *Neurospora* by various chemicals and radiations indicates that the capacity for mutation is dependent on the inherent properties of the gene rather than on the nature of the mutagen; there are, however, certain infrequently occurring deficiency mutants which may depend on the specific action of a particular mutagen. The theoretical possibility that genes may vary in susceptibility to different mutagenic agents is discussed, with reference to *Bacillus subtilis*, which gives rise to biochemical mutants following exposure to X rays or ultraviolet light but which is apparently resistant to nitrogen mustard.

1680. WHEELER, H. E. and MCGAHEN, J. W.
Genetics of *Glomerella*. X. Genes affecting sexual reproduction.
Amer. J. Bot. 1952 : **39** : 110–19.

The effects of genes at four loci upon sexual reproduction in *G. cingulata* were analysed. Data from crosses revealed the occurrence of three alleles at each of the previously reported loci *A* and *B*. Evidence was also obtained of the presence of mutant genes, resulting in complete self sterility and partial suppression of perithecia formation, at two other loci designated *F* and *st*. Genes at *A* and *B* appear to be comparable with genes for mating type found in other fungi. The effects of the genes at the four loci alone or in combination, upon self fertility, mating reactions and cross fertility are discussed.

1681. LEIN, P. S. and LEIN, J.
Suppression of non-allelic acetate requiring mutants of *Neurospora*.
Genetics 1951 : **36** : p. 561. (Abst.).

Attempts to cross two acetate requiring mutants, S 210 and S 34, were unsuccessful; heterocaryons were, however, crossed with both mutants, and isolation of wild type ascospores showed that the mutant genes were nonallelic. The acetate requirement was suppressed in some of the progeny from S 34 crossed with a wild type; a similar suppression was again evident when the same wild type was crossed with S 210. Data indicate that the suppressor gene and genes determining acetate requirements are situated on the same chromosome.

The fact that a single gene suppresses non-allelic mutants, contrasting with previous observations (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 123), is probably due to the development of an alternative method of acetate formation in the presence of the suppressor gene.

1682. SUBRAMANIAM, M. K.
Alleles and their time of expression in yeasts.
Proc. Nat. Inst. Sci. India 1951 : **17** : 367–71.

The simpler types of sculpturing observed in giant colonies of a 2-chromosome brewery yeast (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst.

1479) occur as stages in the development of more complex forms. The multiple alleles conditioning sculpturing appear to be related to one another as hypomorphs and hypermorphs.

1683. Szilvinyi, A. and Gruber-Oberfeuchtner, J.
Die genetische Bedingtheit der Grösse von *Saccharomyces cerevisiae* Hansen.
(Cell size of *Saccharomyces cerevisiae* Hansen as a genetic characteristic).
Mitt. Versuchs. Gärungsgewerbe, Wien 1951 : **5** : 39–44.

Measurements of length and breadth were made on haploid cultures arising from 20 different ascospores of the Uppsala strain of *S. cerevisiae*. The differences in both dimensions were statistically significant and it was possible to isolate lines differing constantly in spore form. By crossing different lines followed by further inbreeding, the range of variation in the dimensions was increased, suggesting that they were controlled by polymeric genes.

1684. Subramaniam, M. K.
On the identification of the various structures in the yeast cell.
J. Indian Inst. Sci. 1952 : **34** : 11–23.

A detailed survey is given of the literature on yeast cytology. The author emphasizes that cytological data obtained from the anaerobic and aerobic phases should be treated separately. Actively dividing cells in well-aerated media have been found to show a homogeneous cytoplasm without granules or vacuoles. By using samples of such cells the author claims to have observed all the stages of normal mitosis; during early metaphase two chromosomes situated on the equator of a thin unstained spindle without fibrils and two centrioles with centrospheres at the spindle poles were identified (cf. Absts. 965 and 966). In the author's view yeasts do not differ in their essential cytological behaviour from higher organisms.

1685. Lindegren, C. C. and Lindegren, G.
Multiplicity function of genes controlling carbohydrate fermentation in *Saccharomyces*.
Genetics 1951 : **36** : 562–63. (Abst.).

Genetical analysis of breeding stock derived from crosses between *S. cerevisiae*, *S. carlsbergensis*, *S. Chodati* and *S. microellipsoideus* has shown that ability to ferment maltose, ascribed to the presence of *MA*, is also associated with fermentation of turanose; *ma* cultures are unable to ferment turanose. The ability to ferment melezitose was incorporated by a series of crosses to *S. cerevisiae* Y–650; the latter carries an allele of *MA*, designated MA^{tsz}, since it controls fermentation of turanose, sucrose and melezitose in addition to maltose. To correspond with the use of superscripts, *MA* can be written as MA^{t} thus indicating that the ability to ferment turanose is associated with the *MA* allele.

1686. Mundkur, B. D.
The genetics of long-term adaptation of galactose by yeast.
Genetics 1951 : **36** : p. 568. (Abst.).

Further studies concerning delayed adaptation to galactose fermentation by *Saccharomyces Chevalieri* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 143) confirm the view that adaptation is determined by a gene g_s, allelic to *G*. Adapted g_s types may frequently become deadapted by transference to a galactose-free substrate. Some clones fail to become deadapted under such conditions; these were crossed with nonfermenting *g* clones on a glucose medium. Their progeny included three distinct ascus types: (*a*) 2*G*: 2*g*; (*b*) 2g_s: 2*g*; and (*c*) 1*G*: 1g_s: 2*g*. Intraascus sibling crosses carried to the F_3 showed that rapidly fermenting clones, which fail to deadapt, comprise mixtures of *G* and g_s cells. It is assumed that g_s mutates spontaneously to *G*.

1687. Raut, C.
Cytochrome deficient yeast strains.
Genetics 1951 : **36** : p. 572. (Abst.).

A cytochrome deficient variant, designated petite, with a strong α absorption band at 550μ was crossed with a cytochrome deficient strain, c, devoid of a cytochrome absorption spectrum except for a barely detectable band at 550μ. The progeny from a single ascus comprised 1 wild type: 1 petite: 2c. Crosses between these petite and c type offspring produced only wild type and c type progeny; the petite character was not transmitted by hybridization although it remains stable through many vegetative generations.

1688. Lindegren, C. C. and Sumner, R. J.
The selective hybridization of yeast.
Baker's Digest 1950 : **24** : 27–29.

A short description is given of the manipulatory technique for hybridizing yeast strains.

1689. Duraiswami, S. and Subramaniam, M. K.
Reversal of some chromosomal mutations in yeasts.
Cellule 1950 : **53** : 213–56.

The discovery of mutants with halved chromosome complements is reported in cultures of both

the autotetraploid BY 3 and the diploid BY 1 grown in wort containing 16% alcohol. Prolonged exposure to alcohol induced a rough diploid variant in the smooth autotetraploid population; this mutant resembled the original diploid from which the tetraploid BY 3 was obtained by the mutagenic action of acenaphthene. After culturing with alcohol a slow-growing dwarfed mutant giving rise to colonies with irregular contour was isolated from BY 1; the haploid dwarf proved highly unstable and soon reverted to the diploid condition, producing rough colonies typical of BY 1.

1690. MITRA, K. K. and SUBRAMANIAM, M. K.
Some observations on the effect of chrysene on yeasts.
Cellule 1949 : **53** : 5–12.

A preliminary account is given of the induction of tetraploidy in a diploid brewery yeast by prolonged treatment with chrysene (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 971).

1691. DURAISWAMI, S. and MITRA, K. K.
Physiological consequences of polyploidy in yeasts. II. Growth and yield characteristics of the diploid and autotetraploid brewery yeasts.
J. Indian Inst. Sci. 1952 : **34** : 25–31.

The yield and growth characteristics of a diploid strain and its tetraploid derivative (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1481) were investigated under various cultural conditions, with a view to the possible utilization of the latter type in manufacturing food yeast. Given sufficient aeration, the tetraploid produced a 75% higher yield of dry matter than the diploid, as a result of higher rate of metabolism and proliferation. Whatever the cultural conditions, the moisture content of the tetraploid was lower than in the diploid. Tetraploidy was associated with increased sensitivity to high concentrations of CO_2; the tetraploid may therefore show the Pasteur effect to a greater extent.

1692. SUBRAMANIAM, M. K.
Tetraploidy in yeasts.
Cellule 1951 : **54** : 143–48.

Cytological evidence for the induction of autotetraploidy in a 2-chromosome yeast strain is presented in the form of photomicrographs, illustrating metaphase and anaphase in diploid cells, in tetraploids induced during treatment with acenaphthene, and in the stable autotetraploids isolated after exposure to acenaphthene for 90 days.

1693. SUBRAMANIAM, M. K. and SREEPATHI RAO, S. K.
Studies on the mutagenic action of chemical and physical agencies on yeasts. IV. The effect of camphor on fermenting yeast cultures.
Proc. Indian Acad. Sci. 1952 : **35** : Sect. B. : 1–27.

An investigation of the effect of camphor on the 2-chromosome brewery strain BY 1 cultured in wort revealed an acceleration of the mutation rate at the locus governing colonial sculpturing. It is probable that none of the mutants found a selective environment, since all colonies inoculated on wort agar showed pronounced sectoring. The succession of mutant forms induced by camphor differed from the series of changes in control populations; this may be due to the induction of individual gene mutations in addition to duplication of whole chromosome complements, in which case all tetraploids resulting from camphor treatment are not necessarily of the same genetic constitution. It is suggested that stable tetraploids arise only when duplication of the chromosome complement is preceded by a specific stabilizing gene mutation. The possibility that mutagenic agents inducing polyploidy may also lead to the development of forms with reduced chromosome numbers is discussed.

1694. BROYLES, J. W.
Sugar and amino acid composition and variations found in urediospores of races of cereal rusts.
Phytopathology 1952 : **42** : 3–4. (Abst.).

Racial differences, both qualitative and quantitative, in sugar and aminoacid composition were found in an analysis of uredospores by paper chromatography.

1695. PAPAZIAN, H. P.
The incompatibility factors and a related gene in *Schizophyllum commune*.
Genetics 1951 : **36** : 441–59.

Evidence has been obtained, from the same cultures as those used in a previous investigation (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1664), that the incompatibility factor *A*, previously thus designated to indicate a single gene because it functions physiologically as a single unit, is actually two closely linked genes. Mutation of an individual gene in the incompatibility group produces a functionally distinct incompatibility factor, and provides an oppor-

tunity for the evolution of a series of new factors by crossing over and recombination between the mutant gene and different alleles of the other genes in the group.

Segregation of the aberrant type of monocaryon, termed streak, was analysed in both random spores and tetrads from crosses between wild type monocaryons and the streak form. Data show that the aberrant growth form is controlled by a single gene; the latter is inherited independently of the *B* incompatibility factor but is linked to the *A* factor. Possible methods by which the streak type originated from so-called flat growths are discussed.

Appendices contain formulae for mapping loci in "unordered" tetrads with three factors, two of which are linked, and for estimating the selective advantage of new incompatibility factors and the increase of inbreeding due to mutation of the incompatibility alleles.

1696. Papazian, H. P.
Multiple-gene control of incompatibility in a hymenomycete.
Genetics 1951 : **36** : p. 571. (Abst.).

Further reference is made to the control of the *A* series of incompatibility factors (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1664 and Vol. XXII, Abst. 1695) by at least two genes, such that crossing-over between these genes produces a new factor in the series; a different allele at a single locus is sufficient to produce a functionally distinct factor.

A fairly low rate of crossing-over maintains a large number of different factors in a population without allowing too much inbreeding.

1697. Gasiorkiewicz, E. C.
Variability in the onion pink root fungus induced by nitrogen mustard.
Phytopathology 1952 : **42** : p. 9. (Abst.)

The induction of pathogenic and cultural mutants of *Pyrenochaeta terrestris* by treating the spores with nitrogen mustard is reported.

1698. Schreuder, J. C.
Een onderzoek over de Amerikaanse vaatziekte van de erwten in Nederland.
(An investigation on American wilt of peas in the Netherlands).
Tijdschr. PlZiekt. 1951 : **57** : 175–206.

The incidence of *Fusarium oxysporum* f. *Pisi* race 1 has been studied from various aspects, including the varietal resistance of Dutch and American peas. Round blue field peas were all susceptible, while marrow fat peas, short-straw grey peas and short-straw maple peas proved resistant, as did also some canning pea varieties from the USA.

1699. Hershey, A. D. and Davidson, H.
Allelic and nonallelic genes controlling host specificity in a bacteriophage.
Genetics 1951 : **36** : 667–75.

The results of experiments on mutants of bacteriophage T2H characterized by changes in host range have led to the conclusion that inheritance of host specificity in this phage is determined by genes occupying at least two different loci and that at least one of these genes is capable of alternative mutations.

1700. Larson, R. H., Stahmann, M. A., Walker, J. C. and Colburn, R. W.
Mutations of potato virus X induced by nitrogen mustard.
Phytopathology 1952 : **42** : p. 25. (Abst.).

Plants of *Nicotiana rustica* inoculated with the spot strain of virus X were repeatedly exposed to the vapour of methyl-bis (β-chlorethyl) amine at 20° C. Subtransfers of isolates originating from single lesions on the treated plants resulted in widely different symptoms. The mutants were classified into four types. They were transferred repeatedly to *N. rustica* without reversion to the original strain. Exposure of the virus *in vitro* to a solution of the nitrogen mustard failed to produce mutants.

1701. Holmes, F. O.
Use of primary lesions to determine relative susceptibility of individual plants.
Phytopathology 1952 : **42** : p. 113. (Abst.).

Test plants as uniformly susceptible to virus infections as possible are chosen; variations in lesion counts are interpreted as indicating differences in virus concentration. By reversing this process and using inoculum of known infectivity, variations in lesion counts can be utilized to indicate differences in susceptibility among individual plants. In cases in which it is desired to test susceptibility of plants which do not ordinarily show visible primary lesions, a modified technique is required. In testing tomato plants derived from hybrids with a low degree of susceptibility to tobacco mosaic virus, for instance, a mutant strain was substituted for ordinary mosaic virus. The number of necrotic primary lesions produced in such a test provides a measure of the relative susceptibility of individual plants to infection by both the mutant and ordinary strains.

CROP PLANTS

1702. Johnson, I. J. and Bragonier, W. H. **Varieties and cropping practices for 1952.**
Iowa Fm. Sci. 1951 : **6** : 79–82.

Information is given on the chief advantages of varieties of cereals, forage crops, flax and soya bean recommended for growing in Iowa.

1703. **Bose Institute, Calcutta. Anniversary meeting.**
Nature, Lond. 1952 : **169** : 105–06.

Current investigations on the cytological and mutagenic action of radiation and chemicals are briefly referred to. Improved mutants of jute have been produced by X ray treatment; plants grown from irradiated seed of sesame appear to be promising as regards yield. The cytological effect of penicillin upon plant cells has been investigated.

1704. **Special technical and advisory work. Twentieth Annual Report of the Minister for Agriculture, Dublin 1950–51** : 84–100.

Appendices. Report of the Agricultural Department, University College, Dublin, for the year 1950-51.
Ibid. 1950–51 : 1–18.

A report of work on propagation of improved varieties of cereals is included. The results of barley variety trials are summarized.

Wheat. Progress is reported in the production of winter wheats possessing high yielding ability and resistance to lodging and *Puccinia glumarum*. The recently released Glasnevin Rosa has continued to give very satisfactory results on fertile soils. Reselection of Redman x Pajbjerg has provided promising types, to be tested in randomized block experiments in the coming season. Valuable new derivatives were secured from crosses of Rosa with Alba and Bersée. Spring wheat breeding continued with the aims of rapid germination, vigorous early growth and plant establishment, lodging resistance and early maturity; promising selections have been isolated from crosses between Rosa and Kärn [Kernel] and between Atle and Fylgia.

Oats. Unlike the chief commercial varieties, some new selections, particularly those from crosses between Potato (Ardee) and Binder and between Bonstar and Acton, are resistant to straw breakdown after ripening. The new hybrid Potato, developed by back-crossing in which Binder was the nonrecurrent parent, has the tillering characteristics of Potato (Ardee) but much larger and plumper grains.

Barley. Work included selection of Spratt Archer x Kenia SA, Binder x Weibulls 4744 and several other hybrids.

Grasses and clovers. In observation plots strains developed at Glasnevin have proved to be better adapted than leading strains from several northern European countries.

Potato. Work on the inheritance of field resistance to leaf roll was concluded (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2812).

Small fruits. Hybrid seedlings of raspberry were selected for propagation. Strawberry crossing continued.

Vegetables. In tomato breeding for resistance to *Cladosporium*, back crosses were made between commercial large-fruited but susceptible varieties and resistant small-fruited types in an attempt to combine large fruit and resistance. Selections of Brussels sprouts were made for trial at the National Institute of Agricultural Botany, Cambridge.

1705. Howard, H. W.
Crops and plant breeding.
J. R. Agric. Soc. 1951 : **112** : 84–95.

Major problems in the breeding of wheat, oats, barley, herbage plants, potatoes, sugar beet and field beans and peas in the United Kingdom are outlined. Brief reviews of research contributing to current agricultural requirements concern: grittiness of wheat flour (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2504); yellow rust resistance in British grasses and cereals; resistance of oats to rust, mildew and frit fly (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 912); development of tetraploid rye in Sweden (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1804); and inflorescence production in ryegrass (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2713).

1706. **New crops.**
Agric. News. Hungary 1952 : No. 12 : p. 6. (Mimeographed).

It is briefly reported that kok saghyz and the sweet potato have been successfully acclimatized in Hungary. Mention is also made of a new fodder beet, developed at the Sopron-Horpács Experimental Farm. It is claimed to be highly resistant to disease, drought and decay in storage.

1707. Pajbjergfondens Forsøgs- og Forædlingsarbejde 1950. (**Experiments and breeding operations of the Pajbjerg Foundation. 1950**) : Pp. 26.

Spring wheat. Tests of 21 new lines from a cross (spring wheat x winter wheat) x winter wheat were continued. In a trial held in 1947,

1948 and 1950 of nine of these Pajbjerg lines in comparison with Progress and Pajbjerg Rex spring wheats, all nine gave good yields; and, except Pajbjerg VK77, all were satisfactory as regards earliness and had very short stiff straw.

Winter wheat. Results of trials during 1948–50 of some Danish and Swedish varieties are given. The new variety Pajbjerg 63/157 is very winter hardy, equals Eroica in yield and surpasses it in stiffness of straw and earliness. Kongehvede II [King wheat II] and three new lines in particular also deserve mention for their high yield as compared with Eroica; this productivity combined with earliness and stiffness of straw makes it possible to discount a certain amount of winter injury. In the 1950 trials Konge gave the highest yield, 5750 kg of grain per ha.

Oats. Average yields of four Danish and one Swedish variety in trials during 1949–50 on three farms were compared with their yields in 1950.

Only three lines have been retained from the cross Örn [Eagle] x Mansholt Binder. Rex, from this cross, has done well in official and local trials; it has a relatively short and stiff straw, large grain and a normal percentage of husk.

Regent has been selected from Rex for very short and specially stiff straw; its short panicle is pyramid-shaped with very stiff spreading top branches; the grain only just attains medium size. In the Pajbjerg and local trials in 1950 it gave the highest yield.

Regal somewhat resembles Regent; it has slightly thicker straw and slightly larger glumes; the husk percentage is about the same as that of Rex, but the grain is smaller.

Rye. The large amount of isolated and inbred lines accumulated for many years was tested for the first time in various hybrid combinations and gave considerably better yields than the controls Petkus and Kongsrug [King rye].

Work on tetraploid rye and rye-wheat was continued and three lines of the latter that resemble wheat were included in trials for the first time in 1950. Many lines resembling rye were sown for observation.

Barley. The breeding material now comprises (1) many new lines from various crosses; (2) a large number of single plants from X-irradiated barley.

Three lines, Kron [Crown], Drost and 54/9 have also undergone local trials in 1950, in which Kron averaged 41·3 hkg. per ha. and Drost 42·4 as compared with 40·3 for Maja. New lines of Maja x Kenia and Maja x a smooth awned barley have been tested, and 10–7, a sister line of Kron, which was derived from the latter cross, is being retained. The new selections from Maja x Kenia, from which Drost was obtained, include line 10/7 and three very stiff strawed lines 81–10, 81–13 and 81–14 which may equal Drost in yield.

Herbage plants. A report on the breeding programme in progress on ryegrass, red clover and other herbage plants will be made at a later stage. Work has begun on the breeding of tetraploid red clover, Alsike and white clover.

Lupin. Ten lines and strains of yellow lupin containing no alkaloid, e.g. Sødlupin [Sweet Lupin] and Weiko, two lines of Pajbjerg Rex, three lines of Pajbjerg Nobi and two other lines bred by the Foundation, are being studied. In trials held during 1949 and 1950 the highest average yield of seed was 30·5 hkg. per ha. from Pajbjerg Rex 515 and the highest average for green forage was 525 hkg. per ha. from Pajbjerg Rex 481. Recovery was specially marked in the two white seeded strains Weiko and Nobi, which also gave abundant seed after the second flowering, an unusual occurrence.

Selection of new breeding material from X-irradiated plants and yellow lupin with indehiscent pods was carried out.

Beets. Family selection having been found inadequate as a method of improving new strains of fodder beet, the Pajbjerg breeding programme is now based, in the first instance, on the production of a series of élites or "minor strains" of the same main type in each group; these strains are then systematically crossed to ascertain their value for strain formation. The initial minor strains should differ somewhat in origin in order to take advantage of hybridization. Results so far indicate that strains produced by this method can be reproduced with great uniformity year after year both as regards type and yield.

Six trials were carried out in which the older type of beet Pajbjerg Ideal I was compared with a new type Pajbjerg Ideal II. The new strain gave a higher total yield of dry matter, a higher percentage of dry matter and an equal yield of roots. The typical truncated cylindrical form has been somewhat modified in the new strain.

Tabulated results of trials of commercial strains of the sugar mangels, Pajbjerg Rex, Pajbjerg Monark [Pajbjerg Monarch] and Gullåker, are also recorded. The first named variety was also included in a trial with the sugar beets Pajbjerg X and Pajbjerg Monark.

Two new élites of the Rex sugar mangel have been developed which may be useful in hybridization: one is a new type, with an unusually large top and slightly superior to Rex in yield of roots and slightly inferior in percentage dry matter; the other, derived from a mixture of six families from the cross Alfa x Factory sugar beet, has a particularly high dry matter content.

Swede. Some new material acquired for crossing purposes included the Bangholm strains Pajbjerg and Willy Øtofte IX with some plants from the cross Bangholm Pajbjerg x Wiener Glaskaalrabi [Vienna White kohlrabi]. The last named variety had a good effect in the crosses in promoting resistance to virus disease.

1708. **Scientific Reports of the Indian Agricultural Research Institute, New Delhi, for the year ended 30th June, 1949 (1951)** : Pp. 205.

Part I includes a survey of the main results of crop breeding and other work carried out at the institute during the period 1905–1948. Among the projects reported in Part II, which covers research for the year under review, the following are of interest:—

Plant introduction. A report is given of work on sweet potato, tapioca, yams, *Canna edulis*, beans, cowpea, sunflower, cruciferous vegetables and grasses and legumes for forage and soil conservation, and on the collection of indigenous wild relatives of brinjal, okra, *Phaseolus*, sunn hemp and other crops.

Wheat. Progress is reported in the breeding of varieties combining resistance to brown, yellow and black rusts.

Cytological investigations on crosses of *Triticum Vavilovianum* with *T. vulgare* and *T. sphaerococcum* are being carried out to analyse the genetic behaviour of ear and glume characters in offtypes.

Studies of drought resistance and other physiological problems are reported.

Maize. Work on the production of suitable inbreds for hybrid maize is in progress.

Sugar cane. Hybridization and selection at the Sugarcane Breeding Station, Coimbatore, Madras, are reported under the headings: bulk and semibulk crosses; experimental crosses for evaluation of parents; sorghum crosses; fodder crosses; nursery seedlings; test plots; bamboo crosses; and crosses for evolving chewing types.

The occurrence of starch in the stem is a specific character for certain species of *Saccharum*.

In preliminary studies of 16 varieties it has been found that relatively small cells in the leaves and starch accumulation in the leaves early in the morning are indices of early maturity.

Various types of *Erianthus* fall into four chromosome groups, with $2n = 20$, 30, 40 and 60. The pentaploid type ($2n = 50$) has been synthesized by crossing *E. Munja* ($2n = 60$) and *E. Ciliares* ($2n = 40$). Certain species of *Erianthus* are characterized by an exserted awn on the fourth glume. A few seedlings ($2n = 30$) from *Narenga porphyrocoma* x *Sclerostachya fusca* and certain types of *S. officinarum* also show this character. These observations suggest that the origin of *Saccharum* spp. and allied genera is highly complex.

Systematic back-crossing of *S. spontaneum* derivatives with suitable male parents is being carried out with the object of obtaining plants with haploid complements of *S. spontaneum*.

Resistance to red rot (*Colletotrichum falcatum*) is receiving attention.

Physiological studies on early and late varieties are being pursued with the aim of enhancing the efficiency and scope of breeding.

The collection of *S. spontaneum* and allied genera from South India has been completed.

Observations for several characters are now being made at Coimbatore to estimate the possible breeding value of the collections.

***Brassica* and *Eruca*.** Studies of colchicine-induced tetraploids of *Brassica* spp. and *E. sativa* continued. The fertility of *B. campestris* var. *Toria* was as low as 2 seeds per siliqua in 1941, and by selection has been raised to an average of 13 seeds; in the diploids the average fertility is 15–20 seeds. In the past few years however, no appreciable increase in fertility has been achieved in spite of vigorous selection.

Tetraploids of toria and sarson breed true for chromosome number, whereas those of *B. juncea* and *E. sativa* do not. In the latter species, irregular meiosis gives rise to 40% unbalanced gametes; free intercrossing between tetraploids and diploids and elimination of chromosomes during mitosis also contribute to the breakdown of tetraploidy.

***Sesamum orientale*.** Investigation of colchicine-induced tetraploids continued. Selection for fertility has not resulted in any marked improvement.

In breeding for resistance to phyllody and *Antigastra catanaulis*, a form with $2n = 26$, ultimately derived from the amphidiploid between *S. orientale* and the resistant species *S. prostratum*, shows promise (cf. Abst. 2162). Interspecific trisomics are to be used in breeding.

Linseed. In work on breeding for resistance to rust (*Melampsora Lini*), strains derived from

crosses between susceptible NP varieties and rust immune introductions were tested for their reaction to the disease, and for other characters, with encouraging results. Promising selections are being developed from crosses between rust resistant NP strains and early provincial types.

Chilli. Colchicine-induced tetraploids are being studied. Selection for fertility has not given promising results.

Tomato. Breeding for varieties combining earliness, high vitamin content and improved flavour, suitable for northern India, has resulted in several selections which are now under extensive trial. In this work use has been made of *Lycopersicon pimpinellifolium.*

Cicer. Work on colchicine-induced tetraploids is mentioned. Selection for fertility has not yielded encouraging results.

Cajanus Cajan. Breeding for resistance to *Fusarium* wilt continued.

1709. HANDIQUE, L. K.
Annual Report of the Department of Agriculture, Assam, for the year ending 31st March 1950 (1951) : Part I : Pp. 357.

Field trials with the following crops are reported from many farms and experiment stations: wheat, maize, millets, forage grasses, potato, cotton, jute, sugar cane, tobacco, mustard, tung, groundnut, *Phaseolus radiatus*, soya bean and peas.

Rice. Several new crosses between winter varieties were effected at the Karimganj station; successive generations of crosses made in previous years were studied (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2436). Numerous promising selections obtained recently from winter and summer varieties have been compared with standard types grown locally in particular areas; those showing superiority in respect of yielding ability or quality are mentioned.
At the Titabar station, As. C 317–1–3A (As. 52 x As. 171–1) has consistently outyielded other summer rices by as much as 48·9%.

Sweet potato. Among 12 strains introduced at Jorhat from the Vivekananda Laboratory, Almora, highest yields were given by B 4304.

Cotton. The report of the Cotton Research Station indicates that selections made from Garo Hill cottons are superior to those from other regions in respect of yield of short, coarse cotton with high ginning percentage.

Citrus. Clonal and seedling progenies have been obtained from one Khasi orange tree of outstanding merit at the Burnihat Citrus Fruit Research Station; the most vigorous are to be selected for field plantings.

Groundnut. A provisional selection known as Type 6 has bred true, outyielding other varieties grown at Jorhat. It is to be increased prior to naming and release.

Cajanus Cajan. Many seedlings introduced from nearby Indian states for inclusion in the breeding programme at the Kokilamukh farm proved susceptible to *Fusarium* wilt. From some 100 promising selections, several true-breeding pure lines were isolated; these combine desirable yielding capacity and quality with resistance to wilt.

1710. **Annual Report of the Department of Agriculture, Pretoria, for the year ended 31 August 1951.**
Fmg. S. Afr. 1951 : **26** : 395–528.

Wheat. At the Stellenbosch-Elsenburg College of Agriculture, tests were carried out to find a satisfactory ecotype for the Western Cape Province. *Agropyron* derivatives are being used to introduce disease resistance into varieties representing the suitable ecotype.

Maize. Progress in the production and distribution of hybrid seed is reported.
The hybrid breeding programme at the Potchefstroom Agricultural College has been considerably expanded. It was again found that American inbreds, and even the best hybrids from the USA, are not sufficiently adapted to South African conditions, although some American inbreds combine well with certain lines developed in South Africa.
Crossing between white dent lines susceptible to streak virus and the resistant hybrid known as Barberton Hickory results in hybrid vigour and improved resistance. Resistant and susceptible lines of dent with superior combining ability are being developed by the method of recurrent reciprocal selection.
At the Agricultural Research Institute, Pretoria, considerable progress has been achieved in developing pure strains as possible parents for hybrids. Planned crossings involving genetic material from the USA have been effected with a view to developing pure strains better than those obtained by the usual method of inbreeding selections from open-pollinated varieties.
Hybrid breeding has also been expanded at the Natal Agricultural Research Institute.

Sorghum. Kaffir corn varieties were selected for resistance to *Pythium arrhenomanes*.

Grasses. Introduction and selection of many species are being carried out at several centres.

Legumes. Imported varieties of lucerne have proved to be poorly adapted in tests carried out by the Potchefstroom Agricultural College. In selection self sterility was among the characters which received attention.

A satisfactory technique of vegetative propagation of lucerne has been devised at the Stellenbosch-Elsenburg College of Agriculture in connexion with polycrossing between promising selections.

Two lupin selections are to be released by the Stellenbosch-Elsenburg College of Agriculture: the bitter blue lupin L5–2A and a sweet yellow lupin selection. Breeding for disease resistance in lupins now requires attention.

Subterranean clovers have shown differences in susceptibility to damage by sand mites.

Work on the artificial culture of excised embryos from incompatible crosses between cultivated and wild cowpeas is being continued at the Natal Institute.

The yields of fodder trees, especially *Gleditschia*, have been studied as the basis for selection. Selection and breeding of *Prosopis* are to be undertaken.

Potato. Breeding is in progress at the Bethlehem Station.

Strain B of late blight has appeared on varieties such as Kennebec which are resistant to the common strain A. New varieties with greater resistance are under trial.

Cotton. At the Barberton Agricultural Research Station strains from MU 8 x BP 52 continue to show superiority over other improved strains such as A 2106, 5143 and U 4 x Sea Island derivatives. Further improvements in plant habit and other characters were sought in MU 8 x BP 52 material. Breeding for resistance to *Verticillium* wilt is being carried out.

Hibiscus. Study of varieties and strains of *H. cannabinus*, *H. Sabdariffa* and *H. Mastersianus* from several countries continued at Barberton. From this material the development of strains with the following characters is now possible: smooth stems, reduced tendency to branch, greater flexibility in photoperiodic reaction and thus increased adaptability to a wider range of planting dates, greater resistance to rust (*Aecidium Garkeanum*), and higher yielding capacity and fibre extraction.

Tobacco. Breeding continued at the Central Tobacco Research Station, Rustenburg. A degree of resistance to mosaic has been attained in some varieties.

Oil crops. Breeding, selection and variety testing of sunflower and other crops were carried out at the Potchefstroom Agricultural College.

Soya bean breeding is in progress at the Natal Institute.

Tree fruits. Breeding and selection of pawpaw and other subtropical fruits are in progress. One aim in pawpaw improvement is the development of a type which will produce a higher percentage of female to male trees; promising material is already available.

Peach hybrids for dessert and canning, developed at the Western Province Fruit Research Station, Stellenbosch, are under final trial. Further crosses were effected to obtain combinations of good quality, resistance to delayed defoliation and suitable time of ripening in dessert or canning peaches.

Grape breeding for improved early varieties is in progress.

In canning tests, many guava hybrid selections have shown superior quality over the standards Fan Retief and Malherbe.

Apricot breeding was initiated, with crosses between Alpha and Royal.

Hybridization was also carried out on Japanese plums.

Hybrid pear seedlings are under observation.

Varieties of peaches and several other fruits were tested for storage quality.

Pineapple. Variants are distinguishable among hybrids between Smooth Cayenne and Queen. Further hybridization between other varieties and lines is under way.

Vegetables. In variety trials, particular attention is being given to the effect of day length.

Two important objectives of tomato breeding are resistance to *Fusarium* wilt and spotted wilt virus. Immunity from eelworm and *Septoria* leaf spot are also receiving attention.

Among the F_1 hybrid tomatoes tested, Pearson x Sunrise, Pritchard x Rutgers and Rutgers x Pearson "S" gave outstandingly high yields.

The possibilities of interspecific hybridization in breeding for disease resistance in the tomato are being explored.

Progress in the breeding and selection of cabbage, onions and peas is briefly reported.

Seedless triploid water melons, produced by means of colchicine-induced tetraploids, are to be tested.

The use of heterosis in cabbage, carrot and beetroot is being considered at the Stellenbosch-Elsenburg College.

1711. **The National Research Council Review 1951.**
Ottawa 1951 : Pp. 285.

Newcombe, H. B. Atomic Energy Project, Chalk River, Ont. Biology and Radiation Hazards Control Subdivision. Genetics Section. (*p. 166*).

Lethal injury and viable gene mutation produced by short ultraviolet irradiation of *Escherichia coli* were appreciably reduced by posttreatment with visible light. It is believed that ultraviolet light acts through the production of chemical substances which are both poisonous and mutagenic and that some of these substances are eliminated photochemically.

Associate Committee on Plant Breeding of the National Research Council and the Dominion Department of Agriculture. (*pp. 212–18*).

University of Alberta.

X-ray-induced mutations.
Techniques of seed and seedling treatments of various crops have been devised as the first step in the exploration of the possibility of inducing mutants with practical value. Special attention was given to barley.

Effects of 2,4-D treatment.
In experiments on wheat and barley, 2,4-D treatment results in chromosomal aberrations (cf. Abst. 1744).

Wheat. Cytogenetical analysis of common wheat through use of nullisomics and monosomic lines continued (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2238). Work is being carried out on the reciprocal transfer and substitution of the chromosomes of Thatcher and Lemhi. Monosomic lines of tetraploid wheat are being established. Monosomic lines of Chinese Spring were used for the analysis of the behaviour of univalents at meiosis. A study was made of meiosis in a haploid plant of common wheat. Pairing of the chromosomes in the haploid and the chromosome associations observed in a high proportion of the progeny obtained by pollinating the haploid with normal pollen suggest that considerable homology exists between the various chromosomes of the genomes of *Triticum vulgare* (cf. Abst. 1775). The distribution of the univalents indicated that at least some of the suggestions on the origin of monosomics from haploids are correct.

Barley. Breeding for loose smut resistance is in progress. Until 1946, Titan was used extensively as a resistant parent, but since that year it has exhibited increasing susceptibility, probably due to attack by a new race. Varieties resistant to the latter have been discovered and are being used as parents. Preliminary work suggests that resistance to both the old and new races is dominant over susceptibility and that resistance to the new race is due to several genes of varying potency. Infection by both races depends upon the genetic constitution of the embryo and not upon the genetic constitution of the floral tissue in which the embryo develops.

Lucerne. Flower colour is being subjected to genetical analysis.

University of Manitoba.

Barley. Inheritance of resistance to leaf rust is being investigated; the study includes possible linkages between genes governing resistance and those determining certain morphological characters.

Lucerne. Preliminary tests in the greenhouse have indicated marked clonal differences in susceptibility to black stem (*Ascochyta imperfecta*).

University of Saskatchewan.

Cereals. Various methods of administering P^{32} to wheat were tested in an attempt to induce mutations. Wheat mutants have been produced by treating dry seeds with high energy X rays from the betatron. Gross chromosome changes are apparent in nearly all mutants; chromosome loss is the most common change. A translocation complex of six chromosomes has been found in X_2 plants of a line treated with 23 M.e.v. Experiments were carried out on shattering to (1) establish a standard of shattering for the cereal varieties grown, (2) assess the reliability of different machines for testing varietal resistance, (3) determine a method by which maximum shattering can be produced each season and (4) analyse the inheritance of shattering in wheat and barley.
No evidence has so far been obtained that resistance to plant pulling is an inherited character.
Studies were carried out on the lodging behaviour of varieties of wheat, oats and barley. The placement of crown roots differed in susceptible and resistant varieties; further analysis of this character is to be carried out. Crown depth had no direct bearing on lodging resistance and appeared to be the result of depth of sowing.

1712. Informe del Instituto Agropecuario Nacional por el período de Enero 1948 a Junio 1949. (**Report of the National Institute of Agriculture for the period January 1948 to June 1949**).
Inf. Inst. Agropecuario Nac., Guatemala 1949 : Pp. 136.

Varietal trials have been undertaken with the following: wheat, oats, barley, rice, leguminous

forage crops, sugar cane, *Cinchona*, citrus fruits and avocado. Many varieties on trial were recently introduced from the USA and Mexico.

Coffee. A breeding programme for varietal improvement was begun. During the three principal flowerings of the season attempts were made to self pollinate all 37 available varieties to determine self compatible types. Emasculated flowers of the local varieties Arabigo and Bourbon were pollinated by 19 other varieties, and 29 additional crosses were made between selected types.

1713. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 18. Specialty and miscellaneous crops.**
US Dep. Agric. 1950 : Pp. 57. (Mimeographed).

Concise information is given on past and present work carried out on the following: *Hevea* breeding in cooperation with South and Central America; testing of plants for domestic rubber production in the USA; breeding and selection of guayule and *Solidago;* breeding of ornamental plants; testing and improvement work on plants used for the production of drugs, oils, insecticides, raticides, tannin, condiments and other miscellaneous purposes; hop breeding; introduction of crops for special purposes; and evaluation of *Cinchona* material in Puerto Rico.

1714. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 39. Research at the State Agricultural Experiment Stations.**
US Dep. Agric. 1950 : Pp. 114.

The first section of this publication briefly reviews the history of legislation authorizing federal aid for agricultural research in the states and territories and also discusses the character and scope of the current programme. The second section provides a more detailed review of the current programme of cooperative regional research, including projects on crop breeding and introduction. The third section deals with crop improvement and other activities in progress at the Alaska Agriculture Experiment Station.

1715. **Science for the Farmer. The Sixty-fourth Annual Report of the Pennsylvania State College Agricultural Experiment Station.**
Bull. 1951 : No. 540 : Pp. 64.

In addition to research summarized below, varietal trials of wheat, oats, soya, barley, fescue, pepper, tomato, egg plant, soya bean and sweet corn are mentioned.

Oats. LeConte (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2467), a stiff-strawed variety as winter hardy as Lee, has been added to the list of varieties suited to local conditions.

Maize. Many new third generation inbreds have shown a higher degree of root rot resistance than the local standards in artificially inoculated plots planted in cool wet weather. Other inbreds possess combined resistance to blight, stalk rot and smut. These lines will be used to improve the yielding capacity of hybrids.
Three recently released hybrids, Pa. 521, Pa. 840 and Pa. 602, have proved superior to older varieties of similar maturity.

Barley. Seed of the new winter strain Ky. X–43 has been increased, under the name Kenbar, to replace Wong in southeastern parts of the state. Kenbar possesses greater resistance to scald (*Rhyncosporium Secalis*) than Wong.

Leguminous forage crops. In eastern areas the wilt resistant lucerne varieties Buffalo and Ranger have survived a second harvest year in long leys; stands of Grimm, Ladak and Narragansett were seriously depleted.
About 100 lucerne clones, selected for their performance in northeastern parts of the state from strains of local origin, have been sent to Nebraska for polycross seed production.
Some 50 pure line clones have been established from red clover plants selected for outstanding resistance to root borer and *Sclerotinia* and *Fusarium* rots.

Potato. A new late variety, 2XJ–1, has given consistent high yields in regional trials, averaging a higher percentage of US No. 1 tubers than 16 widely grown varieties. It shows resistance to leaf roll and is immune from local field races of *Phytophthora infestans*. The specific gravity of 2XJ–1 tubers is similar to that of Russet Rural; cooking quality is good. Seed has been increased for release.
Two promising selections from trials conducted at five centres showed good yielding ability and quality suitable for making potato crisps.
Seedlings possessing two of the three factors for blight resistance isolated from different breeding stocks have proved immune from all races of *Phytophthora infestans* both in greenhouse and field trials.

Tobacco. Nine strains combining resistance to wildfire and mosaic have been selected for desirable yielding capacity and burning quality, using the variety Swarr-Hibshman as a standard.

One mosaic resistant strain will also undergo further trial.

Peach. Analyses of winter hardiness of flower buds in northeastern areas were carried out during April, 1950. Live stigmas were found in 50–57% of the buds of Jerseyland, Valiant and Vanguard, but in less than 25% of the buds of Redcrest, Vedette and Veefreeze.

Cabbage. An improved strain of Penn State Ballhead, a variety which has proved susceptible to yellows, is soon to be released. The newly selected strain produces heads of uniform size resembling the shape and quality of the original variety, but with improved yellows resistance.

Lettuce. Strains of the Great Lakes type producing high seed yields have been selected from populations varying in respect of seeding ability. Analysis of progenies from crosses between the well-branched, early flowering variety Imperial 44 and the unbranched late flowering Great Lakes indicates that the excellent seeding habit of Imperial 44 is dominant over the less prolific seeding capacity of Great Lakes.

Tomato. The functional sterility of the line derived from a mutant of John Baer (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2964) has been transmitted as a simple recessive; no linkage with undesirable characteristics was observed. Improved strains carrying male sterility factors have been selected from progenies of the male sterile line crossed with commercially acceptable varieties and repeatedly back-crossed to the male sterile parent.

Soya bean. Numerous varieties on trial have been divided into early, midseason and late maturity groups under local conditions. Blackhawk (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2258) is recommended as an early non-lodging variety with high yielding capacity.

1716. **Results of research in 1950. 63rd Annual Report of the Agricultural Experiment Station of the University of Kentucky 1950** : Pp. 72.

In addition to variety tests of cereals, grasses and other crops, the following breeding work is of interest:—

Tobacco. Breeding for wildfire resistance in various types continued. Progress is reported in breeding for a combination of resistance to mosaic, black root rot and *Fusarium* wilt. New lines of burley highly resistant to root rot and mosaic and with high leaf number are being tested for yield and quality. Crosses have been made between black shank resistant plants of burley and varieties of the same type possessing resistance to mosaic and black root rot and higher leaf number than the black shank resistant parents. Promising strains of the one-sucker type showing resistance to black root rot and mosaic are to be more extensively tested. New varieties of dark tobacco with resistance to mosaic and black root rot are under trial.

1717. **What's new in farm science.** Rep. Wis. Agric. Exp. Sta. Pt. I : 1950 : Bull. No. 491 : Pp. 88 ; Pt. II : 1951 : Bull. No. 492 : Pp. 108.

In addition to the research reported below, varietal trials of wheat, oats, barley, apple, strawberry and squash are summarized.

Fungi. Mutations were induced in *Phoma lingam, Ph. terrtis,* Botrytis Allii, Ph. byssoidea, Venturia inaequalis* and *Cladosporium cucumerinum* by treating spores with nitrogen mustard.

Maize. When Wis. 204 J and Wis. 22 CIB were artificially infested with equal numbers of corn borers, the former variety was more severely damaged than the latter. It is assumed that corn borers prefer the plant tissues of Wis. 204 J.

Forage legumes. Lucerne varieties of northern origin were better able to survive beneath sheets of ice than southern varieties; the latter proved more resistant to low temperatures in a dry environment than when ice was formed.

A selection with high yielding ability, made from Grimm lucerne, has also shown some resistance to injury from sucking insects. Crosses effected between this strain and varieties resistant to common leaf spot have produced progeny combining high yields with a desirable degree of disease resistance.

Potato. Differences in tendency to develop internal necrosis were found between 29 commercially grown varieties. Immunity was shown by Triumph, Waseca, Setapa, Placid, Desota and Marygold; the most susceptible varieties included Ontario, Hindenburg, Potomac, Pawnee, Russet Rural and Katahdin. In a plot which had been planted with scab infected varieties for several years, the scab susceptible variety Cobbler showed only slight damage when the scab resistant variety Hindenburg was grown during the previous year. It is suggested that a new bacterial race, capable of attacking Hindenburg, developed at the expense of the original bacterial population while

* ? *P. terrestris.*

the resistant variety occupied the plot. This new race was unable to infect Cobbler, in the following year, as successfully as the original bacterial strain.

Symptoms characteristic of rugose mosaic, a disease formerly thought to result from a combination of viruses X and Y, have been caused by virus Y alone. Varieties react differently to the numerous strains of virus Y.

Leaf roll is reported to be caused by a number of virus strains which differ in the type and severity of symptoms they produce. Certain varieties are more severely affected by leaf roll than others; Katahdin proved to be a symptomless carrier.

Tobacco. Wide variations in disease symptoms produced by the tobacco mosaic virus do not appear to depend on a high mutation rate as much as on the interaction of environmental factors, age and vigour of host tissues and permutations of virus strain combinations.

The reaction of wildfire bacteria to artificially introduced bacteriophages influences the rate at which the disease spreads from heavily infected leaves, but is not a major factor controlling the incidence of wildfire on plants attacked for the first time.

Horseradish. Fertile hybrids have been developed between commercial varieties and Bohemian types; they combine the desirable root characters of the former with some degree of disease resistance of the latter. Further breeding is under way to increase resistance to mosaic and white rust.

An investigation of microspore development in ♂ sterile and ♂ fertile plants has shown that close pairing between chromosomes during meiosis depends on the release of surplus desoxyribosenucleic acid from the tapetum. This result was supported by further studies with maize, potato, sugar beet and onion.

Cucumber. A promising strain among scab resistant selections from Maine 2 x National Pickling, back-crossed to National Pickling for six generations, may be grown in badly infected areas in 1952. Further back-crossing is necessary, however, to obtain a shape as desirable as that of National Pickling.

Spinach. Smooth-leaved strains with resistance to cucumber mosaic virus have been developed; at temperatures above 75° F. these strains become susceptible.

Bean. Both US 5 Refugee and Idaho Refugee possess two dominant genetic factors determining resistance to common bean mosaic virus. If a particular one of these factors is replaced by the corresponding recessive, the plant becomes susceptible. When both recessive factors are combined, as in Robust, another type of resistance is established.

Soya bean. Blackhawk (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2258) is well suited to areas where Manchu 606 has been grown recently, and possesses superior yielding capacity and greater lodging resistance.

Peas. Breeding lines with improved wilt resistance, originating from Wisconsin Perfection, Wisconsin Merit and Improved Penin, have outyielded the original varieties. C 140–7, derived from Wisconsin Perfection, is outstanding in respect of yield and canning quality.

1718. **Transactions of the Iowa State Horticultural Society 1950 : 85** : Pp. 260.

Papers presented included the following of interest to plant breeders:

Walstrom, R. J. Honey bees as pollinators. (*pp. 204–05*).

The influence of the pollinating activity of honey bees on the percentage seed set of lucerne and red clover is discussed.

Potato and onion breeding. (*pp. 212*).

Greater attention is being given to cooking quality of potato tubers, as estimated by specific gravity determinations, when making selections from hybrid progenies.

A number of single cross onion hybrids have proved superior to commercial varieties; three-way crosses and top crosses were generally inferior to the single crosses.

The Criss-Cross melon. (*pp. 214*).

The release of Criss-Cross, a new water melon developed privately at Montrose, Ia., is reported. It possesses considerable resistance to anthracnose and *Fusarium* wilt and gives outstanding yields under local conditions. The black-seeded melons have sweet red flesh and thin tough rinds; each weighs about 50 lbs.

1719. Instituto Agronômico do Estado de São Paulo. Pesquisas e trabalhos experimentais em andamento, 1950. (**Agronomic Institute of the State of São Paulo. Research and experimental work in progress, 1950**). Campinas 1950 : Pp. 155. (Mimeographed).

The projects referred to include breeding and genetic work with cotton and coffee and breeding work with rice, wheat and other cereals, potato, sugar cane, citrus fruits, cassava and various legumes and the production of hybrid maize.

1720. Memoria correspondiente al año académico de 1950 presentada por el Director Dr. J. Alberto León a la Junta de Profesores. (**Report for the academic year 1950 presented by the Director Dr. J. Alberto León to the House of Professors**).
Esc. Nac. Agric. Lima 1951 : No. 456 : Pp. 115.

In the report on research, reference is made to the following:—

Maize. Improvements in uniformity of ear type and in grain yield of Amarillo [Yellow] maize resulted from selection. A scheme for producing synthetic varieties is outlined.

Cotton. In a test of 12 varieties the three best were all wilt-resistant selections of Tangüis made at La Molina, the most popular being LMW 12–40 and LM 7–35. The variety Híbrido Tangüis [Tangüis Hybrid], though less productive than LMW 12–40, is being retained because of its long, soft lint of creamy colour, classed as distinctly superior to that of Tangüis. Vernalization of moist cotton seed at temperatures of 75° and 80° F reduced the vegetation period by 27–40 days.

1721. **Notes on current investigations, April to June, 1951.**
Malay. Agric. J. 1951 : **34** : 133–41.

In addition to research summarized below, varietal trials of maize, rice, potato, jute, ramie, Manila hemp, coffee, cocoa, rambutan (*Nephelium lappaceum*), radish and cabbage are briefly reported.

Oil palm. On the basis of yield records over 5 years, 8 plants of E 206 with a dumpy form of growth (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2082) and 16 high yielding palms of normal height have been selected as parent trees. Progenies from E 152 x E 206 and E 206 x E 206 are being observed for further promising individuals. Mature fruits have been obtained from E 206 and three selections of normal height following fertilization with pollen from *Elaeis guineensis* var. *pisifera*.

1722. **Annual Report on the Department of Agriculture Colony of North Borneo for the year 1950** (1951). : Pp. 12.

Adaptability trials of rice, jute and cacao introductions are reported.

1723. **Report of the Waite Agricultural Research Institute, South Australia and associated activities of the Commonwealth Scientific and Industrial Research Organization 1948-1949** (1951) : Pp. 68.

Wheat. The following rust resistant varieties were released: Bencubbin 48, Dirk 48, Dundee 48, Javelin 48, Rapier 48, Ridley 48, Scimitar 48 and Seewari 48 (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 978). In the development of each variety, Gabo formed the source of resistance. A new biotype of stem rust has appeared. New sources of resistance are therefore being investigated; particular attention is being given to hybrids possessing the Hope type of resistance. Progress in the development of forms resistant to Australian races of *Tilletia caries*, *T. foetida* and *Puccinia triticina* is mentioned. The results of yield and quality trials are tabulated. Warigo, Dirk 48, Javelin 48, Ridley 48 and Scimitar 48 have shown highly satisfactory baking quality. The genetics of resistance to races of *T. caries* and *T. foetida* has been studied. The gene for stinking smut resistance derived from variety Doubbi appears to be valuable for breeding purposes.

Pasture grasses. Cytological studies of Australian native grasses are under way.

Fibre flax. Several hybrids proved superior to standards in resistance to lodging. The rust resistant hybrid (Saginaw x Ottawa) x (Norfolk Earl x Norfolk Earl) exhibited sufficient promise to merit large scale trial.

Oil crops. Satisfactory linseed varieties resistant to rust are now available. Detailed analysis of genes for resistance to Australian races of rust has been initiated. Sheyenne and Crystal have shown sufficient resistance to pasmo (*Sphaerella Linorum*) to warrant their use in breeding for resistance to this disease.
Safflower selection 47–53, a strain producing seed with an oil content of 38%, has replaced Niphad 630 as standard.

Tomato. The spotted wilt resistance of the Argentine variety Rey de los Tempranos [King of the Earlies] under local conditions was confirmed. Crosses have been made with the aim of incorporating this resistance in local varieties.

Peas. The early maturing peas Alaska and Collegian Maori King have been distributed.

1724. **Report of the Department of Agriculture and Stock, Queensland for the year 1950-51** : Pp. 94.

Trials with the following crops are reported from different districts: rice, lucerne, potato, sweet potato, jute, kenaf (*Hibiscus cannabinus*), *Urena lobata*, sugar cane for fodder, tobacco, citrus fruits, papaw, *Macadamia* nut, groundnut, grape, onion, tomato, cowpea and soya bean.

Wheat. Many hitherto stem rust resistant varieties proved susceptible to a new biotype;

fortunately Lawrence (cf. Abst. 240) showed a high degree of resistance. Other wheats whose resistance was unaffected included Celebration and a few hybrids from the same source as Lawrence or of Kenya parentage. Another new hybrid selection, TS-K-PF-4601, combining rust resistance, high yields and good quality, has been submitted for naming and subsequent release.

Oats. In grazing trials, the crown rust resistant hybrids Fulghum x Victoria and Victoria x Richland were superior to standard varieties (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1697). Three promising selections from (Bond x Victoria) x Hajira are being finally compared with a view to releasing the best as a new crown rust resistant variety.

Maize. Seed selection within open-pollinated varieties is being curtailed as more hybrid maize is developed.

Sorghum. Promising uniform progenies have been obtained from the grain sorghum crosses Day Milo x Dwarf Kalo and Wheatland x (Wheatland x Betty). Results of trials with 8 grain types at 5 centres show that the locally bred Alpha gave outstanding yields in all districts. In the Gympie district, strains of Coastland proved superior to standard compact-headed varieties in respect of yield and freedom from caterpillar attack.

In sweet sorghum trials Jones, Sugardrip and Honey produced larger fodder yields than the standard Saccaline.

Wide variability in prussic acid content is still apparent among progenies of Roma Sudan and Sweet Sudan; selections with the least possible poisoning capacity are being made.

Cotton. Pedigree selection has continued within jassid resistant strains and a few commercial varieties (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1697).

Sugar cane. Reports from the Bureau of Sugar Experiment Stations are summarized in Abst. 2102.

Linseed. Numerous strains differing markedly from each other in general growth habit and date of maturity have been isolated from several rust resistant varieties. Replicated trials are in progress between 19 selected strains and the standard commercial variety Walsh.

Adaptability trials of introductions from Canada and New Zealand are being undertaken.

Sunflower. At Hermitage, two recently introduced dwarf varieties, Jupiter and Pole Star, consistently outyielded the standard dwarf variety Sunrise by about 350 lbs. per acre.

1725. Wexelsen, H.
Mål og midler i planteforedlingen. (**Aims and resources in plant breeding**).
Norsk Landbr. 1951 : **17** : 426–28.

This address at the Norwegian Agricultural College concerns the organization and resources of Norwegian plant breeding and the role played by the college in the work of producing new varieties of crop plants to meet the special needs of Norwegian agriculture and forestry.

1726. Gehbauer, F.
Die Chemie als Helfer in der Pflanzenzüchtung. (**Chemistry as an aid to plant breeding**).
Mitt. höh. Bundeslehr- u. VersAnst. Wein-, Obst- u. Gartenbau Wien-Klosterneuburg, Bienenkunde Wien-Grinzing, 1952 : **2** : 6–8.

Spraying unfertilized flowers of potato, red pepper and tomato varieties with α-2,4-D or the corresponding acetic derivative, induced fruit setting, though many of the fruits produced were partially or totally seedless.

1727. Rudorf, W.
Utilización de genes de especies espontaneas en la mejora genética de variedades cultivadas. (**Utilization of genes from wild species in the genetic improvement of cultivated varieties**).
Bol. Inst. Nac. Invest. Agron., Madr. 1951 : **11** : 509–16.

A review is given of recent plant breeding projects that have involved the utilization of wild species, special attention being paid to cereals, sugar cane and the potato. It is suggested that the Spanish wild or semiwild cereal species may prove useful to plant breeders.

1728. Jankó, B.
A növénynemesítés korszerű agrobiológiai módszerei. (**Modern agrobiological methods of improving plants**)
Agrártudomány, Budapest 1950 : **2** : 193–201.

A synopsis is given of Lysenko's plant breeding methods.

1729. **Symposium on the origin and distribution of cultivated plants in South Asia.**
Indian J. Genet. Pl. Breed. 1951 : **11** : Pp. 125.

Anderson, E. Inclusive herbaria. (*pp. 1–3*).

The technique of making herbarium records suitable for use in the classification of cultivated plants is discussed.

Müntzing, A. Induced polyploidy in cereals. (*Abst.*) (*pp. 4–6*).

Work on *Triticale* and tetraploid rye and barley in Sweden is reviewed.

Ramiah, K. and Ghose, R. L. M. Origin and distribution of cultivated plants of South Asia—rice. (*pp. 7–13*).

Possibly India and Indochina are the regions where *Oryza sativa* originated; the varietal diversity of rice is greatest in India and the nearest wild relative of cultivated rice, *O. sativa* var. *fatua*, occurs abundantly in this country. Var. *fatua* is considered to be the progenitor of most of the cultivated forms of *O. sativa;* possibly however the floating habit of deep water rices was derived from *O. perennis*. The problem of whether *O. perennis* has been involved in the ancestry of African cultivated rices is regarded as worth investigation. *O. sativa* var. *japonica* is believed to be of more recent development than var. *indica*. Detailed surveys of regions of greatest varietal diversity in south and southeastern Asia, arrangements for the study of the collections at one or two centres, and an intensive programme of interspecific hybridization and cytological analysis of the crosses are advocated.

Sampath, S. and Narasinga Rao, M. B. V. Interrelationships between species in the genus Oryza. (*pp. 14–17*).

Work is being carried out at Coimbatore, Madras, on evolution within the genus *Oryza*, using an extensive collection of species and varieties. The following species have been found to possess a chromosome number of $2n = 24$: *O. sativa, O. perennis, O. australiensis, O. officinalis, O. glaberrima, O. grandiglumis* and *O. breviligulata*. Species with $2n = 48$ comprise *O. Eichingeri, O. latifolia, O. coarctata* and *O. minuta*. The polyploid species show decreased spikelet size compared with diploid species from which they may have evolved. *O. perennis* is regarded as the ancestor of the cultivated rices, having given rise to *O. sativa* in Asia and to *O. glaberrima* in Africa as the result of human selection. Possibly *O. glaberrima* and *O. breviligulata* are of collateral descent from *O. perennis*, and *O. breviligulata* from Africa corresponds to the *fatua* types of *O. sativa* in Asia. *O. grandiglumis*, it is suggested, originated as a segregate from types introduced by man into Brazil. The 48-chromosome species *O. latifolia, O. minuta* and *O. Eichingeri* are believed to have been derived from *O. officinalis*.

Chatterjee, D. Note on the origin and distribution of wild and cultivated rices. (*pp. 18–22*).

The author agrees with the view of R. J. Roschevicz [Roževič] that for the genus *Oryza* as a whole or the sect. *Sativa* the centre of origin was Africa and that *O. sativa* var. *fatua* was the progenitor of the majority of cultivated rices in India and Indochina. Literature on the possible role of *O. officinalis* and other species in the evolution of cultivated rice is examined. *O. breviligulata* is believed to have given rise to *O. glaberrima*. The identity of *O. perennis* should be taxonomically clearer before its possible role as the progenitor of cultivated rice is considered. The distribution of wild rices and philological data provide evidence that eastern India, Indochina and part of China probably formed the region where *O. sativa* evolved. The necessity of further work on the cytotaxonomy and genetics of *Oryza* species for the elucidation of interspecific relationships is stressed.

Pal, B. P. Introduction of wild elements for the improvement of wheat. (*pp. 23–28*).

A survey is given of the use of the tetraploid wheats, *Triticum Timopheevi*, rye, *Aegilops, Agropyron* and *Elymus* during recent years by wheat breeders in various countries.

Chandraratna, M. F. The origin of cultivated races of banana. (*pp. 29–33*).

The wild forms eti-kehel (*Musa Balbisiana*) and unel (*M. acuminata*), indigenous to Ceylon, are described. The possible modes of origin of cultivated banana varieties are discussed. Forms included under *M. sapientum* presumably originated from hybrids between *M. Balbisiana* and *M. acuminata*. In Ceylon, the distribution of the latter two species shows considerable overlap. Dodd's identification of parthenocarpy with female sterility in his hypothesis on the origin of cultivated forms is questioned (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 1094) on the grounds that facultative parthenocarpy associated with a high degree of female fertility is known in *Musa;* possibly female sterility arose independently by mutation in facultative parthenocarpic forms. The triploidy of edible bananas very probably arose through fertilization of unreduced ♀ gametes of parthenocarpic diploids by haploid pollen. Attention is drawn to the likely role of bud mutation in the origin of new forms.

Chakravorti, A. K. Origin of cultivated bananas of South East Asia. (*pp. 34–46*).

The work of the author, Cheesman and others on the origin of cultivated bananas is surveyed under the headings: taxonomy; chromosome numbers; parthenocarpy and edibility; ancestry in edible bananas; origin of *Eumusa* and its relationship with *Physocaulis*; origin of triploidy; origin of triploid varieties; and geographical distribution and localization of the gene centre. The author suggests that triploidy first arose as the result of union between reduced and unreduced gametes of a diploid *Musa* ancestor, immediately after the latter had arisen from an 18-chromosome species of *Physocaulis* by fragmentation of two particular pairs of chromosomes (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 117). It is further postulated that the numerous 3*n* clones existing to-day, have differentiated from only a few, possibly only three, basic types, instead of from a corresponding number of independent triploid zygotes. These basic types were produced accidentally by the union of 2*n* x *n* gametes from the diploid progenitors *Musa acuminata*, *M. Balbisiana* and *M. acuminata* x *M. Balbisiana*. Triploid varieties have been found to be very variable caryotypically, showing not only intervarietal and intravarietal differences but even variability within a single individual: structural reorganization of the chromosomes associated with the triploid condition evidently occurs. New genotypes produced by chromosomal rearrangements give rise to chimeras and thus to bud mutations. It is believed that all the present day cultivated varieties in both hemispheres have originated as bud mutations during centuries of vegetative propagation from the few primary triploids. Taxonomical, geographical and cytogenetical data lead to the conclusion that the centre of origin of *Musa* is the region of Assam-Burma-Siam-Indochina.

Agharkar, S. P. and Govindaswami, S. Origin of the genus Musa *and the cultivated varieties of banana.* (*p. 47*). (*Abst.*).

Study of the morphology, cytology and distribution of wild and cultivated species of *Musa* leads to the view that the region of Assam, Burma and Indochina may be regarded as the chief centre of origin of the genus, with possibly a secondary centre in Malabar and Travancore on the west coast of India. It is suggested that the numerous varieties of cultivated bananas may have arisen in more than one way.

Agharkar, S. P. and Roy, B. On the origin and distribution of cultivated mangoes. (*p. 48*). (*Abst.*).

Study of the geographical distribution of *Mangifera* spp. indicates that the genus originated outside India proper. The only species occurring in India proper is *M. indica*. Selection by man, natural hybridization and bud mutation are discussed as possible modes of origin of cultivated varieties in India. It is noted that the closely allied species *M. indica*, *M. sylvatica* and *M. caloneura* all have a chromosome number of $2n = 40$. Some evidence has been obtained that chromosome size differs according to genotype; the chromosomes of the wild mango, appimidi, are for instance generally much shorter than those of the cultivated varieties so far examined.

Mukherjee, S. K. The origin of mango. (*pp. 49–56*).

Phylogenetic trends are suggested for *Mangifera* spp. belonging to sections I and II. Phytogeographical data lead the author to the conclusion that the genus originated in the Burma-Siam-Indochina region or in the Malay Peninsula. The Assam-Burma-Siam-Indochina area and the Malay Peninsula are regarded as having formed two main centres of speciation. Secondary centres, it is further suggested, occurred in the Sunda Islands, Philippines and Celebes-Banda-Timor group. Reasons are given for the view that *M. indica* arose in the Indo-Burma area. Cytogenetical studies and morphological observations suggest that the mango had an allopolyploid origin and that differentiation of the numerous varieties occurred primarily as the result of gene mutation (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2589 and Vol. XXI, Abst. 1330).

Bhattacharya, S. C. and Dutta, S. Citrus varieties of Assam. (*pp. 57–62*).

Seventeen species of *Citrus* have been identified by the authors, including a new one provisionally named *C. assamensis*. *C. indica* and several other species are regarded as indigenous to Assam. Probably a number of species were introduced from China from the eighth century onwards.

Parthasarathy, N. Some cytogenetical aspects of the origin of sugarcane. (*pp. 63–66*).

A discussion is given of the genus *Saccharum* and the possible origin of North Indian canes, noble canes and *S. robustum*, mainly with reference to cytogenetical work at the Sugarcane Breeding Station, Coimbatore, Madras.

The results of a survey now in progress (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 478) suggest that the centre of concentration of wild *Saccharum* spp. and of grasses related to *Saccharum* occurs in the Himalayas. Forms of *S. spontaneum* and *Erianthus* with lower chromosome numbers are to be found upon the Himalayan slopes; *Sclerostachya* spp. and *Narenga* spp. also occur in this region. Work is therefore to be carried out with the aim of identifying the two basic chromosome sets of *S. officinarum*, each $x = 5$, with the basic complements of forms of *Erianthus*, *Sorghum* and other grasses possessing lower chromosome numbers.

Krishnaswamy, N. Origin and distribution of cultivated plants of South Asia: millets. (*pp. 67–74*).

Taxonomical and cytogenetical literature with bearing on the origin of *Sorghum vulgare*, *Pennisetum typhoides*, *Eleusine coracana*, *Setaria italica*, *Paspalum scrobiculatum*, *Panicum miliare* and *P. miliaceum* is surveyed, with brief reference to work in progress at the Agricultural Research Institute, Coimbatore. The geographical distribution of *Sorghum*, *Pennisetum*, *Eleusine*, *Setaria*, *Panicum*, *Paspalum* and *Echinochloa* spp. and the localization of gene centres are also considered. In a section on the use of wild forms in millet breeding, it is mentioned that interspecific hybridization is receiving attention at Coimbatore.

Bhaduri, P. N. Inter-relationship of non-tuberiferous species of Solanum *with some consideration on the origin of Brinjal* (S. melongena *L.*). (*pp. 75–82*).

The occurrence of polyploidy in *S. nigrum* and its taxonomical significance are discussed. Data on the crossability of *S. Melongena* suggest that *S. incanum* on the one hand and *S. Melongena* vars. *insanum* and *Potangi* are to an equal extent closely related to the cultivated type of egg plant. Cytogenetical investigations are required for the elucidation of the affinities of *S. Melongena*. Possibly the cultivated types of egg plant in India and other countries arose through parallel evolution.

Muhammad Afzal. The history and the present status of cotton in Pakistan. (*pp. 89–94*).

A section describing recent work on improvement of desi and American cotton is included. American varieties with a staple length of $1\frac{1}{8}$ to $1\frac{1}{4}$ in. have now been developed. The shift from the cultivation of medium staple cottons to varieties with longer staple will remain operative until about 75% of the crop possesses a staple of 1 in. or more.

Kundu, B. C. Origin of jute. (*pp. 95–99*).

The author gives evidence in support of the view that *Corchorus olitorius* had its primary centre of origin in Africa and possibly a secondary centre in India or the Indo-Burma region, and that *C. capsularis* had its primary centre in Indo-Burma.

Ramanujam, S. and Joshi, A. B. The use of wild species in breeding improved varieties of cultivated til (Sesamum orientale *L.*) *and some considerations on the origin and distribution of* S. orientale. (*pp. 100–04*).

Work carried out at the Indian Agricultural Research Institute, New Delhi, in an attempt to introduce resistance to phyllody disease and *Antigastra catalaunlis* into *S. orientale* ($2n = 26$) by crossing with *S. prostratum* ($2n = 32$), is outlined. Colchicine-induced amphidiploids were back-crossed to *S. orientale* and hybrids with $2n = 42$ were secured, which were selfed and repeatedly back-crossed with *S. orientale*, giving a majority of plants with $2n = 26$. In the latter all *S. prostratum* chromosomes were eliminated. Desirable gene transferences have however been accomplished since selection of these derivatives has resulted in isolation of lines exhibiting promising vigour, yield and disease and pest resistance. Some of the lines have outyielded the controls by approximately 45%; further trials are to be carried out.

The classification, distribution and chromosome numbers of *Sesamum* spp. and the history and origin of cultivated sesame are discussed. Probably sesame had its primary centre of origin in Africa; it seems likely that India and Japan formed two secondary centres.

Holttum, R. E. Zingiberaceae *cultivated in Southern Asia.* (*pp. 105–07*).

The uses of species of *Zingiber*, *Curcuma*, *Hedychium* and other genera are surveyed. Suggestions are given concerning hybridizations which might provide new forms, e.g. crossing *Z. officinale* with *Z. Ottensii* and with wild Malayan species, and crossing *Elettaria Cardamomum* with native Malayan species. The author expresses the view that breeding in the Zingiberaceae has considerable possibilities.

Kaul, K. N. Some interesting features of the distribution of palms in relation to their origin. (*pp. 108–10*).

Comments by de Candolle and others on the origin of *Cocos nucifera* and *Phoenix dactylifera* are surveyed. Paleontological evidence shows

that both *Phoenix* and *Cocos* were genera with a world-wide distribution in Tertiary times; this distribution was subsequently greatly changed by more recent geological events, probably during the last phases of the Alpine-Himalayan uplift.

Joshi, A. C. The use of anatomical characters in determining the original home of plants. (*pp. 111–13*).

It is suggested that anatomical analysis of large genera such as *Gossypium* and *Saccharum* may prove particularly useful in evolutionary studies. Special structural features showing variation within a species may be valuable in elucidating its origin; from data on the disposition of the two medullary bundles in the internodes of *Achyranthes aspera* the author concludes that this species originated in tropical India.

Synopsis of discussions. Concluding remarks by the chairman. (*pp. 114–25*).

Comments on a wide range of topics are summarized. Recommendations were put forward concerning the establishment of national or international organizations for plant explorations in South Asia, and concerning other steps likely to facilitate crop introductions and breeding in this region.

1730. Zscheile, F. P.
Role of genetics in food quality improvement.
Nutr. Revs. 1950 : **8** : 65–69.

Recent work on genetical factors conditioning the vitamin and essential aminoacid content of crop plants is reviewed.

1731. Ševčuk, T. N.
(Local varieties of crops in Transcarpathian Ruthenia).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. **6** : 23–32. [Russian].

Data are presented concerning many local crop varieties and wild plants collected during an expedition to various farming zones of Ruthenia. Among many outstanding specimens of potential breeding value were: winter wheat of the *erythrospermum* and *ferrugineum* types; hardy winter rye giving high yields of good quality grain; tall varieties of maize including flint varieties adapted to high altitudes; 2–rowed and 4–rowed winter barley; high-yielding varieties of *Setaria* and other millets; insect resistant forms of sunflower, including some very tall strains; and large-seeded high yielding types of both dwarf and climbing *Phaseolus*.

1732. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 23. Foreign activities.**
US Dep. Agric. 1950 : Pp. 29. (Mimeographed).

Activities of the US Department of Agriculture carried out in technical collaboration with other countries, including work on introduction of crops, variety testing, selection and breeding, are briefly surveyed.

1733. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 38. Miscellaneous.**
US Dep. Agric. 1950 : Pp. 112. (Mimeographed).

A section is included which briefly surveys past and present work being carried out in the USA in connexion with plant introduction and the evaluation of introduced material for new crops and breeding.

1734. **Annual Report and Minutes of the 1951 Annual Meeting of the Canadian Seed Growers' Association (Incorporated) 1950-51** : Pp. 111.

The report includes the following contributions: Producing seed for better forage crops in the United States, by C. S. Garrison; Recent developments in forage crops seed production, by J. L. Bolton, describing Canadian work; Recent developments in the breeding of grain crops, by J. B. Harrington; Report of the Cereal Section Plant Breeders' Committee; and Report of the Forage Section Plant Breeders' Committee.

1735. Lelley, J.
Szárazságtűrő növények nemesítésének újabb útjai. **(Newer ways of improving drought resistant plants).**
Agrártudomány, Budapest 1949 : **1** : 379–82.

Recent Russian work on breeding crop plants, in particular cereals, for resistance to drought, is summarized.

1736. **Journal of the Department of Agriculture, Dublin 1950** : Pp. 170.

Cereal variety trials at department's schools in 1948 and 1949. (*pp. 104–18*).

The results of trials of the following varieties at three localities in Éire are reported: the spring

wheats Kärn, Atle, Progress, RMD 4 and Ella; the oats Triumph, Star, Ardri and S 221; and the barleys Ymer, Freja, Kenia and No. 5 [(Kenia x Spratt Archer) x Kenia].

Field experiments, 1949. (*pp. 132–49*). A summary is given of trials carried out in the different counties of Éire on the following: the spring wheats Atle and Progress; the oats Triumph, Victory II and Star; the barleys Ymer, Freja and No. 5 [(Kenia x Spratt Archer) x Kenia]; and maincrop and early potato varieties.

Report of the Seed Propagation Division, 1949. (*pp. 150–67*).
The work of the Division included: propagation and distribution of pedigree cereal seed; maintenance of pure lines of varieties of barley and linseed; the breeding, selection and propagation of new varieties of barley; and testing of barley varieties. The large scale barley variety test comprised Spratt Archer 37, No. 3, Binder, Spratt Archer x Kenia 17 and No. 5.

1737. **Forty-third Annual Report of the Norfolk Agricultural Station 1950-51** (1952). : Pp. 16.

The outstanding results of trials of wheat, oat, barley and potato varieties and sugar and fodder beet strains at the Norfolk Agricultural Station, England, are summarized. The cereals and beets tested included continental varieties and strains.

1738. Rasmussen, L.
Beretning om Landboforeningernes Virksomhed for Planteavlen paa Sjælland 1951. (**Report on the plant cultivation work of the agricultural associations in Sjælland, 1951**).
Beretn. Planteavl. Sjælland 1952 : Pp. 334.
Records are given of local field experiments carried out in various localities in Sjælland (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1712). The crops tested comprise varieties and strains of wheat, rye, barley, clover, lucerne, vetch, root crops, flax, forage peas and garden peas, sugar mangels, turnips, mangels and shallots.

1739. Holme Hansen, H. H.
Lokale Forsøg og andre Planteavlsarbejder. (**Local trials and other work of plant cultivation**).
Beretn. Planteavl. Lolland-Falster 1951: 11–112.
Tabulated and other details are given showing the results of manurial experiments and of variety trials of lucerne, clover, bread cereals, sugar beet and flax (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 184).

1740. **Guide to farm practice in Saskatchewan 1951.**
Univ. Saskatch. 1951 : Pp. 184.
Variety recommendations for cereals, flax, forage crops, fruits and vegetables are given.

CEREALS

1741. Derick, R. A. and Hamilton, D. G. **Cereal crop varieties.**
Agric. Inst. Rev., Canad. 1952 : **7** : No. 1 : 14–17, 50.
An analysis is given of the results of a survey made in 1951 to obtain information on the varieties of cereals and field peas being cultivated in eastern Canada and on their distribution.

1742. Manner, R.
Ålands Försöksfält år 1948. (**The Åland Experimental Plots, 1948**).
Ekenäs 1949 : Pp. 15.

Spring wheat. Trials of Swedish wheats and two Finnish selections Jo 02903 and Jo 01751, bred at Jockis, are recorded. Jo 01751 surpassed Diamant II [Diamond II] and Kärn II [Kernel II] in shortness of straw and both Jo 02903 and Jo 01751 outyielded Diamant II, though their yield of grain was lower than that of Kärn II.

Autumn wheat. The Finnish wheats Jo 02945 (Jarl x Olympia), bred at Jockis, and Varma were compared in trials with the Swedish bred Odin, Aros and Virtus; the last named is recommended as a high yielding variety for the Åland Islands.

Oats. The Finnish oats Sisu and Jo 0395 were included in trials with Guldregn II [Golden Rain II], Seger [Victory], Sol II [Sun II] and Stjärn [Star]. Sol II and Sisu were superior in yield and straw strength.

Rye. In trials with Stål II [Steel II] and Kungsråg II [King rye II], the Finnish variety Pekka and the selection RO1 bred at Jockis overwintered best and gave the highest yields of grain. Stål II nearly equalled Pekka in yield and with its short stiff straw is a particularly valuable rye for the Åland Islands.

Barley. Two new selections, Jo 0360 and Jo 0554, bred at Jockis, were compared with Balder. Jo 0360 gave an abundant yield and

surpassed Balder. The two selections both had weaker straw than Balder.

1743. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Chapter 5. Grains.**
US Dep. Agric. 1950 : Pp. 130. (Mimeographed).

Current projects on the breeding and utilization of maize, wheat, oats, barley, rye, grain sorghums and buckwheat are enumerated. A brief survey of outstanding results from past projects is provided; additional lines of research are indicated.

1744. UNRAU, J. and LARTER, E. N.
Cytogenetical response of cereals to 2,4-D. I. A study of meiosis of plants treated at various stages of growth.
Canad. J. Bot. 1952 : **30** : 22–27.

Meiosis was studied in plants of the wheats Thatcher and Stewart and the barley Olli which had been sprayed with 2,4-D at different stages of growth and in the corresponding controls. Meiotic irregularities were produced by the treatment in some plants of each of the three varieties at all stages of growth. The percentages of abnormal metaphases and anaphases were as follows: 0·0 to 35·3 in Olli; 0·0 to 33·3 in Stewart; and 0·0 to 25·0 in Thatcher. The aberrations included bridges, fragmentation, asynapsis, aneuploidy, polyploidy, chain and ring formation and extreme stickiness of the chromosomes. Cytogenetical investigations are being carried out to discover whether the irregularities are transmitted to succeeding generations.

1745. OVČINNIKOV, N. N.
(Regular variability in the size of pollen grains within the same spikelet). Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 8 : p. 79. [Russian].

Experiments at the Kišenev State University with Lutescens 1163 wheat, Lochow oat, Taraščanskaja 4 rye and Brown County Dnepropetrovskaja [Dnepropetrovsk Brown County] maize showed that the pollen grains taken from the primary florets were larger than those from the secondary florets. Counts of the pollen grains in the stamens of oat and rye showed that the stamens of the primary florets contained more pollen grains than those of the secondary florets.

1746. PESOLA, V. A.
Lantstråsädes- och ärtsorternas tidigare och nutida utbredning i Finland, deras egenskaper och betydelse för växtförädlingen samt tillvaratagningen av desamma. **(The former and present distribution in Finland of land varieties of cereals and peas, their characteristics and importance for plant breeding and their collection).**
Maataloust. Aikakausk. 1951 : **23** : 193–210.

A record is presented of work in Finland on the study of land varieties and their value and use in the breeding of autumn rye, autumn wheat, spring wheat, barley, oats and field peas. The importance of maintaining and describing collections of local varieties is emphasized.

1747. JURJEV, V. JA.
(The élite seed of the Harjkov State Breeding Station and some questions relating to seed growing).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 8 : 44–50. [Russian].

Varietal trials of cereals, peas, beans and sunflower at the Harjkov State Breeding Station are reported. Mičurinite methods of improving varietal seed include continuous selection, environmental training, cross pollination, supplementary fertilization, training the parental material before making crosses and using seed originating in different districts or harvested in different years.

1748. HMELEV, B. I.
(Vegetative hybridization of the Gramineae in current scientific literature).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 6 : 69–74. [Russian].

This article describes briefly nine methods of grafting vegetative organs and seeds, with numerous references to modifications of genetical characters accomplished by Soviet scientists. A list of 31 references to articles and manuscripts dealing with vegetative hybridization is included.

1749. D'OLIVEIRA, B.
The centers of origin of cereals and the study of their rusts.
Agron. Lusitana 1951 : **13** : 221–26.

Although aecidia of *Puccinia Hordei* have only been found so far on 3 species of *Ornithogalum*,

26 species native to Europe, the near East or north Africa were found to be susceptible experimentally.
In the case of *P. rubigo-vera* var. *Tritici*, 36 species of *Thalictrum* showed some degree of susceptibility to the aecidial stage, the most susceptible being European or Asiatic species. *Isopyrum fumarioides*, susceptible to Siberian races of the fungus, is immune to Portuguese biotypes.
Eight groups of races of *P. rubigo-vera* were differentiated in the uredospore stage from material collected in the aecidial stage from Portuguese members of the Boraginaceae.

1750. Guyot, L.
Étude biométrique de *Puccinia graminis* Persoon (rouille noire des Graminées). [**Biometrical study of *P. graminis* Persoon (black rust of the Gramineae)**].
C.R. Acad. Sci. Paris 1945 : **220** : 700–01.

Varieties of *P. graminis* are differentiated by the dimensions of the uredospores and teleutospores, the distinctions being correlated with host range.

1751. Šumilenko, E. P.
(The specialization of crown rust of oat).
Bot. Ž. (Bot. J.), Moskva 1951 : **37** : 635–42. [Russian].

Under Stavropolj conditions, *Rhamnus Pallasii* serves as an intermediary host for *Puccinia coronata*. It was found that the aecidia were capable of developing upon several wild grasses, in addition to oats. Grasses capable of transmitting the parasite in the uredospore stage to oats included *Avena* spp., *Dactylis glomerata*, *Calamagrostis* sp., *Bromus inermis*, and *Agropyron repens*.

1752. McKinney, H. H. and Sando, W. J.
Susceptibility and resistance to the wheat streak-mosaic virus in the genera *Triticum*, *Agropyron*, *Secale*, and certain hybrids.
Plant Dis. Reporter 1951 : **35** : 476–79. (Mimeographed).

Seedling inoculation tests for reaction to wheat yellow streak mosaic were carried out on species of *Triticum*, *Agropyron* and *Secale* and on selections from crosses of commercial wheats with several species of *Triticum*, *Agropyron*, *Aegilops* and *Secale*. In *T. dicoccum* 7% of the seedlings were free from mosaic; all the seedlings of the remaining 13 species of *Triticum* showed mosaic. None of the 17 *Agropyron* species tested exhibited mosaic but a few developed local lesions. No systemic virus has so far been detected in any of the *Agropyron* species studied. *Secale* spp. were highly resistant or immune; in all the commercial varieties of *S. cereale* resistance was very high. Most of the highly resistant hybrid selections carried genes for resistance from *Agropyron elongatum*. Some *Agropyron*-wheat hybrids failed to develop local lesions or mosaic after two inoculations. It is however pointed out that selections possessing a high degree of resistance or possible immunity will require many additional crosses with wheat before desirable commercial wheats can be secured.

1753. Vestergaard, E.
Abed Planteavlsstation. (**Abed Plant Breeding Station**).
Beretn. Planteavl. Lolland-Falster 1951: 5–10.

The current report (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2509) from this station contains the following information:—
Wheat. At the Abed Station, populations from the cross Eroica x Joncquois form the nucleus of the high yielding plant material for breeding purposes and the lines previously mentioned for their high yield and short straw have maintained their reputation (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 10).
The six numbered selections that had survived the 1946–47 winter, Abed 8–23 Eroica, Abed 8–25 Eroica and Abed 8–28 Eroica, with Abed 8–33 Eroica x Joncquois, Abed 8–41 x Joncquois and Abed 8–53, 32 x Joncquois, have all proved superior to Eroica in yield. The two Eroica-Joncquois hybrids differ considerably from Eroica in their longer and stiffer straw and are probably the most promising wheats bred and produced at Abed recently.
Oats. In the official trials, Palu (Abed 206), probably to be released for general cultivation late in 1951, was outstanding on high and low moorland and surpassed the Swedish Örn [Eagle] and Stål [Steel] in yield. The fact that Palu could be produced in the heavy loam with a high reaction figure, as at Abed, rather refutes the view that soil is so important in breeding work; and uniformity of soil would seem to be the main point in ensuring reliable experimental results. Palu is being used as a parent for future breeding material.
Barley. Trials were carried out in which Swedish barleys were compared with Maja, Pajbjerg Drot [Pajbjerg King], Plougstrup 544, Øtofte Fero and Alfa among others.

The numbered varieties under test in the breeding plots totalled 55. Six of the newest Abed varieties have outyielded Maja by 2–4% on the average for three years and were to be tested against Herta in 1951. One of these barleys, Abed 7–95 Rigel, has shown remarkable resistance to lodging and is therefore being crossed with other varieties. Some German barleys bred for resistance, e.g. Haisa Neu [New Haisa], Schweigers Erica and Strengs Franken III are to undergo preliminary trials at Abed and the highest yielding resistant variety will be used for further breeding operations.

WHEAT

1754. CHIN, K. -C.
Relations phylogénétiques entre le *Tr. vulgare* et le *Tr. monococcum* d'après le pigment pourpre. (**Phylogenetic relations between *Triticum vulgare* and *T. monococcum* as revealed by purple pigmentation**).
C.R. Acad. Sci. Paris 1944 : **219** : 195–96.

The distribution of anthocyanin in purple varieties of *T. vulgare* and *T. monococcum* shows various differences, in particular, purple pigmentation of the anthers characterizes the latter species but not the former. The author is of the opinion that the distribution of pigmentation within wheat species throws doubt on the phylogenetic value of the classificatory schemes of Körnicke and Percival.

1755. DE VILMORIN, F.
A propos des blés de printemps. (**In connexion with spring wheats**).
C.R. Acad. Agric. Fr. 1951 : **37** : 554–55.

Some hybrid lines from crosses made at Verrières, France, are mentioned as combining satisfactory yield and baking quality with good resistance to black rust.

1756. STARKOV, A. A.
(**Experiments with hybrid seed of winter wheats at varietal field stations in the Rostov province**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 8 : 75–77. [Russian].

Trials of intervarietal hybrid seed of Odesskaja 3 [Odessa 3], Odesskaja 12 and Hostianum 237 obtained by open pollination at the Lysenko Institute of Breeding and Genetics are reported. The F_4 of the above hybrids proved earlier, more vigorous and uniform in development and more productive, and the 1000 grain weights of the hybrids were higher than those of the initial varieties.

1757. RJURIKOV, N. A.
(**Producing hybrid seed of spring wheat**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 8 : 70–71. [Russian].

Lutescens 62 has been improved by intervarietal hybridization at the Šatilovo State Breeding Station. The hybrid seed maintained heterosis for several years giving the highest yield in the third generation. Multiplication by intravarietal open pollination of the material intended for production of heterotic seed on farms is in progress. A method, which does not preclude self pollination or selective fertilization involving self pollen, has been developed. It consists of partial removal of the outer paleae without injuring the male reproductive organs.

1758. FUKASAWA, H.
[**Hexaploid wheat plants obtained from (*Aegilops ventricosa* x *Triticum durum*) x *T. vulgare***].
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : p. 9. [Japanese].

Ae. ventricosa was crossed both with *T. durum* and *T. dicoccoides*, and the F_1 plants then crossed either with *T. vulgare* or *T. Spelta*. In the case of the cross (*Ae. ventricosa* x *T. durum*) x *T. vulgare*, plants with 42 chromosomes were obtained. The fertility of these forms ranged from 28 to 84%; 21 bivalents were only found occasionally, the usual metaphase configurations being $20_{II} + 2_I$, $1_{IV} + 18_{II} + 2_I$, $1_{III} + 19_{II} + 1_I$, $19_{II} + 4_I$ or $1_{III} + 18_{II} + 3_I$.
In the cross [(*Ae. ventricosa* x *T. durum*) x *T. Spelta*] x *T. vulgare*, unawned and awned plants appeared in a 1 : 1 ratio. In the F_2 of (*Ae. ventricosa* x *T. durum*) x *T. Spelta*, the ratio was 3 : 1. The ratio of nonhoary to hoary plants in the cross [(*T. dicoccoides* x *Ae. ventricosa*) x *T. vulgare*] x *T. vulgare* was 1 : 1; in the F_2 of (*T. dicoccoides* x *Ae. ventricosa*) x *T. vulgare*, the ratio was 13 : 3.

1759. NAKAJIMA, G.
(**Meiosis in a triple F_1 hybrid between wheat and rye**).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 36–37. [Japanese].

Triticum turgidum was crossed with rye, and the F_1 crossed to *T. vulgare*. The progeny of the second cross had chromosome numbers ranging from 39 to 44. Meiosis was studied in the 42-chromosome segregates, and in these 12–15

bivalents were noted, the arrangement 14_{II} + 14_{I} being typical. It is supposed in this latter case that the bivalents represent the A and B genomes of the two wheat species, and the univalents the D and R genomes.

1760. Hintzer, H. M. R.
De bakeigenschappen van kruisingen van tarwe en rogge (triticale). 1. Enige eerste onderzoekingen aan materiaal van oogst 1949. [**The baking qualities of hybrids of wheat and rye (*Triticale*). 1. Some preliminary investigations on samples from the 1949 harvest**].
Landbouwk. Tijdschr., Wageningen 1951 **63** : 789–98.

Comparison of the grain of Petkus rye, the wheat Carsten's V and the hybrids Carskus (Carsten's V x Petkus), TR 287/49 and Lokus (Lovink x Petkus) has shown that 1000 corn weight, protein content, gluten content and quality can be improved by crossing wheat and rye. On the other hand, such crosses may possibly lead to a greater susceptibility to germination in the ear, as a consequence of activation of the amylases in the grain.

1761. Matsumura, S.
(**Hybrids between wheat and *Agropyron***).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 27–29. [Japanese].

Chromosome configurations are given for F_1 hybrids of *Triticum turgidum*, *T. Timopheevi* and *T. Spelta* on the one hand and *A. glaucum* on the other. The results suggest that *A. glaucum* has two B genomes in addition to two genomes not homologous with any in the wheats used.

1762. Shebeski, L. H. and Wu, Y. S.
Inheritance in wheat of stem rust resistance derived from *Agropyron elongatum*.
Sci. Agric. 1952 : **32** : 26–35.

Inheritance of seedling resistance to stem rust was studied in the F_1 and F_2 of crosses of Apex, Thatcher and Red Egyptian with the perennial wheat PW 357–5. The latter was derived from Chinese x (Chinese x *A. elongatum*). A large scale method of inoculation to induce stem rust epidemics under greenhouse conditions was used; the method is useful not only in genetical investigations but also in purifying breeding stocks. Apex and Chinese showed susceptibility in the seedling stage, whereas Thatcher, Red Egyptian and PW 357–5 were highly resistant; race 56 was the chief component of the inoculum used. Data from all three crosses gave evidence that PW 357–5 carries three pairs of dominant complementary genes for resistance, most probably derived from *A. elongatum*. Resistance to race 15B, possessed by a sister line of PW 357–5, is apparently inherited in a similar manner.

1763. Motrenko, T. G.
(**Changes occurring in spring wheat varieties when sown in late autumn**).
Agrobiologija (Agrobiology) 1951 : No. 5 : 8–16. [Russian].

The second and third generations of several spring wheats produced progenies showing intraspecific and interspecific changes when sown in the Rostov province in late autumn. The highest proportion of plants with changed heritable properties was obtained with the hard spring wheats Rostovskaja 25 [Rostov 25], from Melanopus 69 x Hordeiforme 432, and Rostovskaja 26, from Melanopus 69 x Affine 309. They mostly produced soft wheats of the *erythrospermum*, *lutescens* and *ferrugineum* types. Melanopus 69 and Donskaja Garnovka [Don Garnovka], hard wheats obtained by individual selection, gave fewer individuals with changed properties in their progenies than Rostovskaja 25 and 26. The soft wheats they produced were mostly awnless. Less extensive changes occurred with the soft spring wheats Pionerka [Pioneer] and Albidum 43, but a few individuals of the hard wheat type were obtained.

1764. Rapaics, R.
A búza és a rozs átalakulásának kérdése a magyar biológiai szakirodalomban. (**The question of the mutual transformation of wheat and rye in the Hungarian biological literature**).
Agrártudomány, Budapest 1951 : **3** : 357–58.

Instances are cited, beginning with Szentiványi in 1689, of claims by Hungarian writers that wheat and rye are changeable into each other.

1765. Remeslo, V. N.
(**Some facts on the origination of other species in fields of branching wheats**).
Agrobiologija (Agrobiology) 1951 : No. 6 : 16–19. [Russian].

Conversions of a wheat species into other species of wheat, and of wheat into rye and barley were

observed in the experimental fields of the Mironovo State Breeding Station. The initial material comprised (*a*) hybrid seed of a branching wheat originating from the Experimental Base of the Lenin Agricultural Academy at Gorki Leninskie, (*b*) the spring wheat Vetvistaja Kahetinskaja [Branching Kahetian] and (*c*) hybrid seed from Vetvistaja Kahetinskaja x Ukrainka [Ukrainian].

The changes of wheat into rye occurred in the F_1, F_2 and F_3 of the material from Gorki Leninskie and of wheat into barley in pure fields of Vetvistaja Kahetinskaja and in the F_1 of Vetvistaja Kahetinskaja x Ukrainka. New forms, varieties and species of wheat were obtained in experiments with hybrid material from Gorki Leninskie and with pure Vetvistaja Kahetinskaja.

1766. Moh, C. C. and Smith, L.
An analysis of seedling mutants (spontaneous, atomic bomb-radiation-, and X ray-induced) in barley and durum wheat.
Genetics 1951 : **36** : 629–40.

Studies were carried out on the third and fourth generations of mutants obtained from durum wheat and barley exposed to X rays and atomic bomb radiation; in barley spontaneous mutants were also available for comparison. The seedling mutants were classified into six main types, all recessive. Differences between mutants arising spontaneously or as a result of either kind of irradiation were not great enough to be of biological significance. Over 20% of the mutants did not segregate according to the expected ratio of 3 : 1. It was concluded that chromosomal aberrations, possibly deficiencies, associated with a considerable proportion of the mutants, or pleiotropy of the mutant genes, best accounted for these deviations.

1767. Hmelev, B. I.
(The effect of stock on scion when transplanting cereal embryos to a foreign endosperm).
Agrobiologija (Agrobiology) 1951 : No. 5 : 123–33. [Russian].

Experiments with several vegetative hybrids, mostly wheat on wheat or barley on wheat, at the USSR Scientific Research Institute of Sugar Beet, are reported. It was found that heritable changes occurred only when the vegetative hybrids developed well during the early stages of growth.

The influence of the stock was particularly marked in material obtained by a method involving sexual and vegetative hybridization. For instance, vegetative hybrids of the hard wheat Narodnaja [People] on the soft wheat Lutescens 62, when crossed with Lutescens 62, resembled the male parent more than vegetative hybrids of Narodnaja on Narodnaja x Lutescens 62. The difference between these hybrids became more apparent still when the embryos of the first seed generations were grafted on Lutescens 62 and Narodnaja endosperms respectively.

Some plants obtained by grafting embryos of the barley Gruševskiĭ on endosperms of the wheat Lutescens 62 produced two or three ears on each culm. Such abnormal plants did not occur in the first and second seed generations, but by grafting the scions of the first seed generation again on embryos of Lutescens 62, several F_0 plants producing anomalous culms bearing several ears were obtained. Some of these plants gave anomalous F_1 plants.

1768. Atti del Convegno di Cerealicoltura, Lonigo 20–22 Maggio 1951. (**Transactions of the Conference on Cereal Cultivation, Lonigo, 20-22 May, 1951**)
Genetica Agraria, Roma 1951 : **3** : Nos. 1–2 : 129–78.

Oliva, A. Lo stato attuale della granicoltura nell'Italia settentrionale. Le razze granarie e loro possibilità. (*The present position of wheat cultivation in northern Italy. The varieties of wheat and their possibilities*). (*pp. 143–55*).

The speaker, reviewing wheat production in northern Italy in the last 50 years and the varieties grown, as well as their suitability for the very different types of land and soil of the region, shows that northern Italy may well become the national granary of the country.

Maliani, C. La sperimentazione in atto presso l'Istituto di Tecnica Agraria "Nazareno Strampelli" di Lonigo. (*The research in progress at the Nazareno Strampelli Institute of Technical Agronomy at Lonigo*). (*pp. 156–78*).

The speaker outlined briefly the following aspects of the research conducted by the above institute, in conjunction with other bodies: wheat breeding and the production and distribution of suitable varieties for various localities; importation and breeding of early and late types of hybrid maize; and the supply of improved sugar beet seed.

1769. Uchikawa, I.
Genetic and cytological studies of speltoid wheat. VI. Chromosome location of the speltoid- and the compactoid gene in *Triticum vulgare* Vill., and the position of the C-chromosome in genom.
Mem. Ehime Univ. 1950 : Sect. II : **1** : 1–19.

When type I heterozygous compactoid wheat (ABC/ABCC) is crossed with a type C homozygous speltoid (ABS_1/ABS_1), speltoid heterozygotes (ABC/ABS_1) and normal types ($ABS_1/ABCC$) appear in the F_1. The type I heterozygous compactoid, when crossed with S_2S_2 normal plants (ABS_2/ABS_2), also gives two types of F_1 plant, namely, normal types (ABC/ABS_2) and semicompactum types ($ABS/ABCC$). Since the phenotypes of $ABS_1/ABCC$ and ABC/ABC are both normal, and those of $ABS_1/ABCC$ and ABC/ABCC are both of semicompactum type, it is concluded that the compactoid gene is on the S_2 arm of the C chromosome.
In the F_2 of the cross type C homozygous speltoid (ABS_1/ABS_1) x type B homozygous speltoid (AB/AB), speltoids with 40, 41 and 42 chromosomes appeared, showing that the S_1 fragment cannot carry the speltoid gene. When S_2S_2 normal plants (ABS_2/ABS_2) were crossed with a type B homozygous speltoid, the F_1 consisted of heterozygous speltoids (AB/ABS_2); and heterozygous speltoids (BC/AB) also appeared in the F_1 of the cross homozygous short normal (BC/BC) x type B homozygous speltoid (AB/AB). From these results, it is inferred that the A chromosome cannot carry the speltoid gene, which must accordingly be located on the B chromosome.
In the F_1 of crosses between d, e, f and g dwarfs on the one hand and a type B homozygous speltoid on the other, the most frequent meiotic configuration was $19_{II} + 2_I$. In the F_1 of *Triticum dicoccum* x a type B homozygous speltoid, $13_{II} + 8_I$ was the usual arrangement, and in the F_1 of type B speltoid x *T. aegilopoides*, $5_{II} + 17_I$. From these results, it is inferred that the C chromosome belongs to genome B.

1770. Lilienfeld, F. A.
H. Kihara: Genome-analysis in *Triticum* and *Aegilops*. X. Concluding review.
Cytologia, Tokyo 1951 : **16** : 101–23.

The work of Kihara and others on genome analysis in *Triticum* and *Aegilops* is comprehensively surveyed under the following headings: definition of genomes and genome homologies; principles of genome analysis; influence of plasma upon genome manifestations, especially with regard to fertility; calculation methods concerning the distribution of univalents and the interchangeability of the paired chromosomes; new systematics of the genus *Aegilops*; autopolyploidy and allopolyploidy; cytological investigations; and segmental differentiation of genomes. In concluding, the author briefly expresses the view that the establishment of a genome collection at a centre such as Beltsville, Md., for international use, would greatly add to the progress of breeding and genetics.

1771. Smith, S. G.
Mutations in polyploid cereals. IV. A segmental chromosome deficiency determining an α series ratio in a speltoid wheat.
Canad. J. Bot. 1951 : **29** : 607–30.

The expression of the bearded-speltoid complex in *Triticum vulgare* is prevented by epistatic inhibitors located approximately 30 cross-over units apart on the major arm of chromosome C. It has been previously shown that this complex is inherited in a unitary fashion (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1506 and 1527). Het speltoid mutants lack one of the two sets of inhibitors. In the series β type of segregation (1 normal: ca. 5 het speltoid: ca. 0·03 speltoid), the loss of a whole C chromosome is involved. Loss of the longer arm of C or of an interstitial segment of this arm is responsible for the series γ type of segregation (1 normal: 1 het speltoid: ca. 0·05 speltoid). A third type of progeny ratio, in series α, comprises a deviation from a 1 : 2 : 1 ratio as a result of a varying degree of deficiency in the number of speltoids, and less markedly, the number of het speltoids. In the present paper cytogenetical investigations are reported indicating that the α type is also due to loss of an interstitial segment of chromosome C but too small to be demonstrated.
Deviations from the ratios characteristic of the three series have been found to be determined by the degree of pollen certation superimposed upon the proportion in which normal and mutant ovules are produced. In the α and γ series the amount of certation may be estimated from the progeny ratios, i.e. normal pollen = N + (H −Sp): mutant pollen = 2 x Sp.
The following characters are roughly correlated: length of the mutant Cd chromosome, percentage of conjugation between C and Cd, proportion of normal to speltoid progeny,

percentage of β segregates among the het speltoid progeny of γ het speltoids, and the coefficient of certation (frequency of functioning of mutant pollen in relation to frequency of its formation). The percentage of het speltoids of series β expected from the het Sp progeny of α and γ het Sp forms may be calculated from the formula $\frac{H - (N + Sp)}{H}$.

1772. YAMASHITA, K.
Studies on X-ray induced reciprocal translocations in Einkorn wheats. III. A newly synthesized ring of 14 chromosomes in a complex heterozygote, *aegilopoides monococcum*.
Cytologia, Tokyo 1951 : **16** : 164–76.

By X irradiation of dormant seeds of *Triticum aegilopoides* and *T. monococcum*, 16 types of reciprocal translocation were induced. Successive crosses involving plants carrying different types of reciprocal translocation resulted in all possible combinations of rings and pairs, among the 14 Einkorn chromosomes, including a *T. monococcum-aegilopoides* heterozygote consisting of a 14-chromosome ring. Pollen fertility is discussed in relation to ring configurations. The significance of these results to the elucidation of the evolution of *Oenothera* is briefly considered.

1773. SEARS, E. R.
Misdivision of univalents in common wheat.
Chromosoma, Berlin 1952 : **4** : 535–50.

Three types of misdivision were observed during cytological studies of the speltoid chromosome, monosome IX, at telophase I and II of microsporogenesis in the variety Chinese Spring. The most common misdivision consisted of two identical arms of the chromatid pair passing to one pole while the other two arms remained acentrically on the equator or passed to the opposite pole; this kind of division was responible for most, if not all, of the isochromosomes produced. In some misdivisions one normal chromatid passed to one pole while the two arms of the other chromatid passed separately to the opposite pole, or one or both remained acentric on the plate; in others, three arms moved to one pole and the fourth arm passed to the opposite pole or remained on the plate. More misdivisions were observed at T I than at T II. High frequencies of misdivision of monosome IX were also recorded in three other varieties derived from Chinese Spring or with parents similar to those of the latter.

In all material studied, both isochromosomes and telocentrics were formed by a variety of types of misdivision at T I. At T II some of these isochromosomes were converted to additional telocentrics by a second misdivision, while more telocentrics were formed by misdivision of a few chromosomes which divided normally at the first division. There was a tendency for the last-formed telocentrics to be lost.

The possibility that telocentrics may misdivide to form isochromosomes in postmeiotic divisions is discussed with reference to megasporogenesis.

1774. SEARS, E. R.
The behaviour of isochromosomes and telocentrics in wheat.
Chromosoma, Berlin 1952 : **4** : 551–62.

Isochromosomes and telocentrics for the long arm of chromosome IX of Chinese Spring wheat (cf. Abst. 1773) behave as normal chromosomes in many respects. During meiosis the average percentage frequency of formation of telocentrics from each arm of isochromosome IX was 7·0% compared with 10·8% from the same arm of a normal chromosome IX; with respect to the formation of isochromosomes from telocentrics and from the long arm of a normal chromosome IX, the average frequencies were 13·3% and 7·0%. No significant difference was found in the frequency of isochromosome formation among 16 independently produced telocentrics.

In somatic tissues isochromosomes were occasionally lost; data indicate that the somatic loss of telocentrics was more frequent. Rare mitotic aberrations included formation of an isochromosome from a telocentric and addition of a telocentric to an isochromosome; it is supposed that two complex aberrations observed, involving loss and duplication of parts of arms, probably occurred at meiosis.

1775. MCGINNIS, R. C. and UNRAU, J.
A study of meiosis in a haploid of *Triticum vulgare* Vill. and its progenies.
Canad. J. Bot. 1952 : **30** : 40–49.

Meiotic studies were carried out on a haploid observed in an F_3 line of the intervarietal cross Lemhi x (Bunyip x Dicklow) and on the F_2 and F_3 selfed progenies of plants obtained by pollinating the haploid with normal pollen from Lemhi. In general the chromosomes were distributed throughout the entire cell at metaphase I in the haploid. Random distribution of the univalents to the poles was apparently restricted by bivalent and secondary association. A large number of cells with 1 to

3 bivalents was observed. So-called secondary pairing was also frequently recorded, consisting merely of a loose end-to-end association of univalents with no sign of a chiasma. One cell had 21 bivalents; some cells with 42 univalents were also noted: the possible origin of such cells is discussed. The bivalent formation is regarded as evidence of homology between chromosomes of the haploid set. A high frequency of trivalents and quadrivalents occurred in the F_2 and F_3; the probable mode of origin of these aberrations from reciprocal translocations that occurred in the haploid is analysed.

1776. Greer, E. N., Ridyard, H. N. and Kent, N. L.
The composition of British-grown winter wheat. I. Vitamin-B_1 content.
J. Sci. Food Agric. 1952 : **3** : 12–14.

During the three seasons 1947–49, samples of 11 commonly grown winter varieties obtained from six centres by the National Institute of Agricultural Botany showed a mean vitamin B_1 content of 1·13 i.u. (= 3μ grm. aneurin)/grm. of grain at 13·5% moisture content. Two varieties, Bersée and Vilmorin 27, consistently contained more vitamin B_1 than others; over three seasons they averaged 1·26 and 1·25 i.u./grm. respectively. A positive correlation was found between protein and vitamin B_1 contents.

1777. Yamashita, K.
[**A male mutant in *Triticum monococcum* induced by X irradiation and its chromosomes (preliminary note)**]
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : p. 57. [Japanese].

A mutant has been induced in which the development of the female parts of the floret is suppressed. Meiosis is normal. The mutant has been located on chromosome c.

1778. Granstaff, E. L.
Wheat varieties commercially important in the hard red winter wheat area.
Kansas St. Coll. Ext. Serv. Pp. 18.

Simple and well illustrated descriptions, based upon the diagnostic features of the ear and kernel, are given of 12 important varieties cultivated in the hard red winter wheat region of the USA.

1779. Pisarev, V. E. and Žilkina, M. D.
(Directed changes of the dormancy period of the seed of spring wheat Moskovka).
Agrobiologija (Agrobiology) 1951 : No. 5 : 61–66. [Russian].

Heritable changes in the spring wheat Moskovka [Moscow], which tends to germinate prematurely, were obtained at the Institute of Grain Farming for the Nonblack-earth Belt. The treatments consisted of cold-storing sheaves of Moskovka, pulled in the field with roots intact during the wax maturity stage, heating the seed for 30 minutes in water at 55° C and a similar hot water treatment of the seed after prolonging the dormancy period of the seed in the previous generation by the cold storage method. The best results were obtained with material selected from Moskovka when two seed generations in succession were treated with hot water.

1780. Siev (Weiss) [Ziv], D.
On the growth cycle and developmental stages of wheat and sorghum.
Palest. J. Bot. 1951 : R. Ser. : **8** : 27–31.

Experiments with the late maturing *Triticum durum* variety Nursi (*Plant Breeding Abstracts*, Vol. XXI, Abst. 232) were continued in Israel during the 1947–48 season. Seedlings subjected to long photoperiods of 22 hours beginning 13 days after germination, started to produce inflorescences when only 49 days old; under normal conditions the heading stage is reached after about 130 days in this late variety. It was further shown that Nursi resembled the early maturing *T. vulgare* varieties, BIPM, CCC and Florence in proceeding to a second vegetative phase of tillering when appropriate growing conditions and short days were provided. Thus the predetermined succession of developmental stages, postulated by Lysenko, is observed only when long days follow short in both early and late varieties of wheat.
Plots of *Sorghum cernuum*, given adequate moisture and warmth during the winter, also produced a new series of tillers after the grain had ripened; these tillers headed the next summer; the same plants again passed the following winter in a vegetative phase, resuming reproductive growth in the third year. It is therefore assumed that the death of an annual after its first reproductive cycle is not "an inherent physiological necessity."

1781. Bianchi, A. and Forlani, R.
La fioritura nel frumento. **(Flowering in wheat).**
Genetica Agraria, Roma 1951 : **3** : Nos. 1–2 : 51–88.

Crosses involving Mentana 220, Tevere, Fiorello, Damiano, Velino, S. Pastore, Roma, 96, Est, 210 and Yeoman II showed that when the time of flowering was similar in both parents, the F_1 were earlier than the parents, but the F_2 tended

to lose their earliness. Crossing of varieties very dissimilar in the onset of flowering time resulted only in intermediate behaviour in the F_1.
Most of the results would fit in with some kind of absolute dominance of earliness, though a few hybrids behave like the late flowering P_1. The most likely interpretation of the facts would therefore be multifactorial control of flowering time and an interference of heterosis with dominance.

1782. Bondarenko, G. K.
(The inheritance of productiveness in intervarietal hybrids of winter wheat).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1950 : **71** : 545–47. [Russian].

The effects of multiparental hybridization and direct and reciprocal crosses upon the productiveness of Ukrainka 246 [Ukrainian 246], Hostianum 237, Odesskaja 3 [Odessa 3], Krymka Mestnaja [Crimean Local], Lutescens 9, Covelle and Kanred-Fulcaster were investigated at Sineljnikovo, Ukraine.
Yield analyses showed that most hybrids from crosses between two varieties were 4 to 47·3% less productive than those from the multiparental crosses, although a few hybrids between two varieties outyielded the multiparental hybrids by 2·6 to 13%.
The most productive material derived from Odesskaja 3, with the exception of the cross Odesskaja 3 x Lutescens 9, was that obtained from pollinating it with mixed pollen. The material from direct and reciprocal crosses between Odesskaja 3 and the other varieties yielded 4·7 to 41·6% less. The hybrids in which Odesskaja 3 was involved as a female parent were 2·6 to 17·2% more productive than those from the reciprocal crosses. Similarly, material with a high yielding capacity was obtained by multiparental hybridization of Lutescens 9. The only simple cross which proved more productive was Hostianum 237 x Lutescens 9.

1783. Gurevič, L. I.
(The influence of pollination methods upon the process of form development in sexual hybridization of wheats.)
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1950 : **70** : 707–10. [Russian].

The effects of selfing and cross-pollinating with large and small amounts of pollen upon the inheritance of F_1 hybrids of Pseudo-meridionale 122a x Alborubrum were investigated at the Central Asiatic Station of the USSR Institute of Plant Industry.
The material from selfing with a large amount of pollen produced a wide range of forms, mostly of the semiawned type. The hybrid families continued segregating in later generations. On the other hand, the hybrids selfed with a few pollen grains gave mostly awned forms in the next generation and also some *pseudo-Barbarossa*, *Delfi* and *anglicum* types. The material from selfing with a few pollen grains was more constant morphologically than that from selfing with a large amount of pollen. Similar differences in the inheritance of the hybrids Pseudo-meridionale 122a x Alborubrum depending on the method of cross pollination were observed. Pollination of the F_1 hybrids with five pollen grains of Pseudo-meridionale 122a and, two hours later, with a large amount of Alborubrum pollen gave progenies resembling, with the exception of the shape of grain, Pseudo-meridionale 122a. An inverse order of pollination had the effect of the progenies combining, in a varied degree, the characters of both parental forms, but in both instances the material obtained was uniform in respect of its morphological and economic characters. On the other hand, alternate pollination of the F_1 hybrids with large amounts of pollen, first of one and then of the other parental form, gave material which segregated extensively.

1784. Suhobrus, F. E.
(The influence of different breeding methods upon the properties of hybrids).
Agrobiologija (Agrobiology) 1951 : No. 6 : 92–101. [Russian].

Breeding experiments with winter wheat at the Mironovskaja State Breeding Station are reported. The most promising material was obtained by intervarietal open pollination involving Ukrainka [Ukrainian], Lutescens 17 and Erythrospermum 15 as female parents. New varieties thus obtained include Erythrospermum 251, yielding 52·1 c. per ha., Lutescens 186, yielding 52·6 c. and Lutescens 118, giving 51·7 c. respectively.
The effects of different breeding methods upon inheritance were studied. Experiments with open pollination, involving two or several varieties of *erythrospermum*, *lutescens*, *velutinum* and *hostianum* wheats, showed that most F_1 plants resembled the female parent, irrespective of whether it possessed dominant or recessive characters, while a few other forms carried either dominant or recessive characters. A high

percentage of the F_1 hybrids obtained by restricted free pollination, a method involving emasculation and isolation of the female parent together with only one pollinating variety, were *velutinum* wheats. The differences between the effects of unrestricted and restricted free pollination upon segregation in the F_1 are recorded.
Analyses of the progenies obtained by unrestricted free pollination showed that forms resembling the female parent increased in later generations, while the number of other forms and varieties decreased. Hybrids obtained by restricted free pollination, on the other hand, produced more *erythrospermum* plants and fewer plants of *velutinum* and other types in later generations. It is pointed out that most of the original crosses did not involve any *erythrospermum* parent.

1785. Greer, E. N., Pringle, W. J. S. and Kent, N. L.
The composition of British-grown winter wheat. II. Iron and manganese contents.
J. Sci. Food Agric. 1952 : **3** : 16–18.

Small but significant differences in the content of iron and manganese were found between 11 wheat varieties grown at six English centres (cf. Abst. 1776). Little Joss consistently showed a high iron content, averaging 4·04 mgrm./100 grm. of grain, and Holdfast contained more manganese than other varieties, averaging 3·34 mgrm./100 grm.; the mean iron and manganese contents of all varieties studied were 3·4 and 2·8 mgrm./100 grm. respectively. Although a positive correlation exists between iron and protein contents, no significant relationship was detected between manganese and either protein or iron contents.

1786. George, M. C. (Jun.)
Morphological responses of three common wheat varieties to four fertility levels.
Abstr. Doct. Diss. Ohio Univ. 1949–50 (1951) : No. 61 : 149–53.

An analysis was made of the morphological aspects of the yield responses shown by the wheats Thorne, Trumbull and Minhardi when grown at four levels of fertility for several seasons. The data obtained did not support the hypothesis that yield can be correlated with one or more morphological characters in a fixed pattern. It was concluded that morphological characters can be of use in helping to eliminate the less desirable plants but cannot form the sole criteria in selection. A generally vigorous plant appears to be the prime requisite.

1787. Veselov, V. M.
(Producing winter branching wheat).
Agrobiologija (Agrobiology) 1951 : No. 6 : 20–23. [Russian].

Mičurinite methods of breeding branching wheat for winter habit at the Nemerčanskaja Breeding Station included hybridization between Kahetinskaja Vetvistaja [Branching Kahetian] and nonbranching winter wheat, and training the hybrid material for the winter habit by sowing it in late autumn. This shattered the inheritance and many spring and winter forms of cereals were produced. These included wheats of the *turgidum*, *durum* and *vulgare* types and even some rye plants. The latter were remarkable for their vigour, good tillering capacity and tall thick straw. The plants with the best developed branching ears were selected. They produced further segregates, including several barley plants. However, training and selection of the material has given several lines of winter branching wheat, which appear to be constant. Training the branching wheat for the winter habit without hybridization proved a slower method, although the plants thus obtained showed a greater uniformity in later generations than the hybrid material.
Breeding of wheats with large ears is also in progress.

1788. Ryžeĭ, I. P.
(Breeding varieties of winter wheats with ears producing many grains).
Agrobiologija (Agrobiology) 1951 : No. 6 : 24–29. [Russian].

Mičurinite breeding of winter wheats for improved yielding capacity in Kirgizia (cf. Abst. 275) has continued and new large-eared forms, including some *caesium* and *erythrospermum* types have been obtained. They produce ears 16–20 cm. long with 80 to 120 grains each and weigh 4–6 grm.
New methods to stimulate the development of branching ears, which may be fixed in later generations, have been studied. A method showing promise consisted of removing portions of the ear to intensify the flow of nutrients to the remaining portions of the ear. The material so treated, comprising varieties of hybrid origin and specially bred multiple hybrids, was grown upon good soil and the treatment was repeated for several years. The most promising plants were selected from R–32 and Erythrospermum 247. They are multiple hybrids resembling

Triticum turgidum although this species was not involved in the development of either variety.

1789. Feĭcarenko, A. I.
(The production of branching forms of soft spring wheat).
Agrobiologija ((Agrobiology) 1951 : No. 6 : 30–31. [Russian].

Highly productive wheat with branching ears was obtained at the Ljgov Research Breeding Station by cross-pollinating emasculated Lutescens 62 plants with mixed pollen of Melanopus 69 + Kahetinskaja Vetvistaja [Branching Kahetian]. The F_1 plants had long ears and many spikelets and many grains per ear. The 1000 grain weight of the F_1 plants was higher than that of Vetvistaja Kahetinskaja. Branching wheat was also obtained at the institute by grafting Lutescens 62 embryos on Melanopus 69 endosperms.

1790. Bowman, F., Maharg, L. and Poehlman, J. M.
Testing Missouri soft wheat flours for quality : methods, and variety comparisons.
Res. Bull. Mo. Agric. Exp. Sta. 1951 : No. 480 : Pp. 71.

A report is presented of investigations carried out at the Missouri Agricultural Experiment Station since 1941 to devise simple methods of testing soft wheat flours used for making cakes and biscuits, and to study the quality characteristics of commercial varieties and experimental strains and also the effects of environmental conditions upon quality.
Early Premium, Clarkan and Kawvale, representing a range in quality from very good to poor, formed the controls in the variety tests. In addition to Early Premium, varieties and strains found to be excellent in quality comprised Michigan Wonder, Fultz, Fairfield, Mediterranean, Dunbar, Wabash, W 5253 Kawvale x Early Premium, W 5488 White Federation x Early Premium, Vigo and Butler.

1791. Soares Telles, I. P. de and Cepero, P.
Calidad industrial de 26 variedades de trigo inscriptas en el Registro Oficial. **(Industrial quality of 26 wheat varieties listed in the Official Register).**
Bol. Produc. Fomento Agric. 1951 : **3** : No. 23 : 2–17.

Full details are given of the baking quality of 26 Argentine hard and semihard bread wheats.

1792. Morozov, P. V.
(The filling out of the grain in several varieties of spring wheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 6 : 67–68. [Russian].

During July and August 1950, the rate of increase in dry matter content, estimated by measuring the 1000 grain weight every three days, was faster in grain of the early and medium maturing varieties Saratovskaja 29 [Saratov 29], Lutescens 62 and Artemovka, than in the later varieties Iskra [Spark] and Hordeiforme 5866.

1793. Franco, A. F. de S.
Subsídio para a caracterização dos trigos no estado de planta nova. **(Contribution towards a characterization of wheats in the young plant stage).**
Melhoramento, Elvas 1951 : **4** : 5–66.

A study was made of characteristics of the young plant such as the colour of the first leaf (coleoptiloid), habit, and characters of the auricles and ligules, in a number of Portuguese varieties of *Triticum vulgare, T. durum* and *T. turgidum*. Diagnostic keys are presented which enable the above characters to be used in classifying the species and varieties.
Studies on the anatomical character of the coleoptiloid, leaf sheath and leaf blade of the young plants led to the formulation of further keys based on these features.

1794. Sánchez-Monge, E. and Villena, L. M.
La clasificación varietal de *"Triticum aestivum"* L. s.l. **(The varietal classification of *T. aestivum* L. s.l.).**
An. Estac. Exp. Aula Dei 1952 : **2** : 250-69.

A revision in Spanish is given of Mansfeld's key to the botanical varieties of *T. aestivum* (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1760).

1795. *Kuzjmin, V. P.
(The winter wheat Babaevka).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 7 : 59–62. [Russian].

A new wheat, named Babaevka, has been developed for the steppe region of Šortanda by selecting the hybrid population obtained from crossing a selection from Hostianum 237, known as Lutescens 4, with both Akmolinka 1 and Šortandinka. It combines the slow autumn growth and winter hardiness of Lutescens 4 with the drought resistance, vigorous spring growth,

* An extended summary of this paper is on file at the Bureau.

early maturity and high yielding capacity characteristic of both Akmolinka 1 and Šortandinka.

1796. *Timofeeva-Tjulina, M. T.
(The hardiness of wheat-*Agropyron* hybrids).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 7 : 12–20. [Russian].

The hybrids 254, 599 and 702, arising from crosses with *A. glaucum*, proved equal or inferior to Moscow 2453 in respect of winter hardiness. A comparison of Lutescens 329, *A. glaucum* and Moscow 2411, from which hybrid 254 was derived, has shown that *A. glaucum* tends to germinate too readily during temporary warm spells in early spring when temperatures are below the critical level for initiation of the light phase. It is therefore suggested that hybridization between Lutescens 329 and Moscow 2411 alone would give rise to offspring with even greater hardiness than hybrid 254.
A similar analysis of hybrid 702, resulting from (Lutescens 62 x *A. glaucum*) x Kooperatorka and subsequent open pollination, indicates that hardiness was probably incorporated during the period of open pollination, since all three parents are less hardy than the final hybrid.

1797. Šulyndin, A. F.
(The hardiness of soft wheats developed from hard spring wheats).
Agrobiologija (Agrobiology) 1951 : No. 5 : 3–7. [Russian].

The soft winter wheats, Erythrospermum S–89, Turcicum S–89 and Ferrugineum S–89, were obtained when Mutico-Valencia S–89, a spring variety of *Triticum durum*, was grown for several generations as a winter wheat. The initial variety had been bred from soft wheat x hard wheat. The new soft wheats became hardier with every season when sown in late autumn. This change was accompanied by a reduced rate of respiration and an increased capacity for accumulation of sugars.

1798. Zarubaĭlo, T. Ja. and Kisljuk, M. M.
(Vernalization at temperatures below zero as a method of training wheats for hardiness).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 8 : 19–26. [Russian].

The effects of temperatures below freezing point during vernalization upon heritable properties of several wheats were investigated at the Laboratory of Genetics, USSR Institute of Plant Industry. The evidence suggests that the inheritance of wheats will be shattered when the seed is first vernalized at 0° C before sowing and then, for a period of 10 to 25 days, at — 8° C. Plants whose inheritance is shattered most profoundly will not ear until the following year. All the treated material shows increased resistance to frost. The acquired hardiness is further improved in later generations when the temperature at the beginning of vernalization is also reduced to one or several degrees below zero.

1799. *Stefanovskiĭ, I. A.
(Increasing the hardiness and yield of winter wheat hybrids).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 7 : 21–25. [Russian].

Analyses of F_1 and F_2 progenies of Albidum 15203 fertilized by a combination of pollen from Velutinum 34004, Milturum 30901 and Erythrospermum 38286 show that, although characters of only one ♂ parent are apparent in the F_1, an average of 1–5% of the F_2 plants are obviously influenced by one or both of the remaining pollinators. Many F_2 plants possess increased cold resistance and yielding capacity as a result of multiparental pollination, thus indicating the desirability of using pollen mixtures from a wide range of varieties.

1800. Zelenskiĭ, M. A.
(An improvement in the propagation of cereals).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 9 : 69–71. [Russian].

Comparisons between plants of the wheat variety Lutescens 62 grown from a single batch of soaked seeds show that early-sprouting grains give rise to more vigorous plants with higher percentage survival in drought than those sprouting a few days later. The advantages of selecting vigorous seedlings, which germinate soonest after soaking, for production of élite seed are emphasized.

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* An extended summary of this paper is on file at the Bureau.

1801. Miyake, M. and Suetsugu, I.
(Damage to wheat varieties from rain, in particular the influence of germination in the ear upon the quality of the grain and flour).
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 19–24. [Japanese].

Varietal differences are noted in the extent to which germination in the ear due to rainy weather causes deterioration in flour quality.

1802. Lelley, J.
Beszámoló az 1950 évi búzanemesítési kísérletekről. **(Report on the wheat improvement experiments in 1950).**
Agrártudomány, Budapest 1950 : **2** : 639–45.

Data are provided on the resistance to lodging and shedding and on the flour quality of Hungarian varieties.

1803. Pisarev, V. E.
(The advance of hard wheat towards the Nonblack-earth Zone).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 8 : 34–39. [Russian].

Breeding hard wheats adapted to cultivation in the Nonblack-earth Zone at the USSR Institute of Plant Industry, Puškin, is described. Earlier work consisted of multiple hybridization involving crosses of *Triticum persicum*, remarkable for its moderate temperature requirements, *T. durum* and *T. dicoccum* var. *pycnurum*. Some promising material was obtained by crossing the resultant hybrids with various hard wheats, particularly Hordeiforme 10.
Recently, several lines have been selected from these hybrid populations. They have large vitreous grain and firm straw and their growth periods are similar to those of the standard Moskovka [Moscow].

1804. Lukjjanenko, P. P. and Lukjjanenko, P. A.
(Breeding early and productive varieties of winter wheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 8 : 10–18. [Russian].

Breeding work with wheat at the Krasnodar State Breeding Station is described. The methods included distant hybridization involving the Argentine spring wheats, Klein 31 and Klein 33, and intergeneric hybridization between wheat and rye.
Skorospelka L–1 [Early L–1], from Kanred-Fulcaster 266287 x Klein 33, is remarkable for its short firm straw, productive ear and resistance to rusts and bunt. In trials conducted in the northern Caucasus it outyielded the standard Novoukrainka 83 [New Ukrainian 83] by 3–7 c. per ha. and was 4–6 days earlier. The hardiness and resistance to loose smut of Skorospelka L–1 was improved at a later stage, by sowing it for several generations in late autumn.
Skorospelka L–3, derived from the same parents, showed similar properties to those of Skorospelka L–1, except that it was more productive, less susceptible to brown rust and a little hardier than the former.
Skorospelka L–2 from the same cross as the above varieties was less productive. However, when crossed with Lutescens 17 it gave a promising new variety Lutescens 18h4 (=Skorospelka Bezostaja 18h4 [Early Awnless 18h4]). It shows resistance to rusts and lodging and is hardy, early and productive. It yields 10·1 c. per ha. more than Novoukrainka 83. Its baking and milling properties are as good as those of the standard variety and better than those of Skorospelka L–1 and Skorospelka L–3.
Mention is made of promising material, including the F_1 and F_2 of Skorospelka L–1 x rye and Skorospelka L–3 x rye, which is still under trial.

1805. Futrell, M. C.
Development of *Erysiphe graminis tritici* on susceptible and resistant common spring wheats.
Phytopathology 1952 : **42** : p. 8. (Abst.).

In the resistant wheat CI 12633 (*Triticum Timopheevi*) the cuticle and cell wall of the seedling leaves were penetrated in a similar fashion to that observed in the susceptible variety Henry, but hyphal development ceased upon contact with the host cytoplasm and the cytoplasm of the epidermal cells was disorganized soon after hyphal contact, the infected cells soon collapsing.

1806. **High-yielding variety of wheat released for South Carolina.**
Crops and Soils 1952 : **4** : No. 6 : p. 27.

Mass selection from Y 2652 (Leapland x Fronteira) at the Clemson Experiment Station has given rise to a high yielding variety with resistance to loose smut and mildew. The new wheat is well adapted to conditions in South

Carolina and has been tentatively named Anderson.

1807. Dekaprelevič, L. L.
(Breeding work with Dolis-puri winter wheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 9 : 27–31. [Russian].

The relative advantages of developing improved strains of Dolis-puri wheat by selection and hybridization are discussed. Promising strains, obtained by fertilizing varieties of Dolis-puri with pollen from Ukrainka [Ukrainian], Novoukrainka [New Ukrainian] and other non-Georgian varieties, were superior to the original Dolis-puri types in respect of grain yield, ear size, straw stiffness and loose smut resistance.

1808. Litzenberger, S. C.
Reaction of cereal varieties to smuts in Alaska.
Plant Dis. Reporter 1951 : **35** : 482–84. (Mimeographed).

Data are given on the reactions of spring barley varieties to *Ustilago Hordei*, spring oat varieties to *U. Kolleri* and *U. Avenae* and of spring wheats to *Tilletia caries* and *T. foetida* during 1950 and 1951. Many barley varieties with adequate resistance to *U. Hordei* are suitable for growing in Alaska. Among the smut resistant oats only Gopher is recommended; the other varieties are too late maturing or too low in yield. Golden Rain possesses the best combination of characters for Alaskan conditions but is smut susceptible. Golden Rain and Climax have been crossed with Vicland, Cherokee or Eaton to develop early varieties resistant to smut. Further work is necessary to discover sources of bunt resistance for wheat improvement but at present earliness is a more important character; varieties earlier than Khogot are required.

1809. Guyot, L.
Étude biologique de *Puccinia graminis* Persoon (rouille noire des Graminées).
[Biological study of *P. graminis* Persoon (black rust of the Gramineae)].
C.R. Acad. Sci. Paris 1946 : **222** : 566–68.

Information is given on the host range of *P. graminis* in France. Many physiological races of *P. graminis* var. *Tritici* have been discovered. The most promising wheat varieties as regards rust resistance are GN, Heines Kolben, Oro, Thatcher and Warren.

1810. Lowther, C. V.
Seedling resistance vs. adult-plant susceptibility of Mentana wheat to race 15B of *Puccinia graminis tritici*.
Plant Dis. Reporter 1951 : **35** : 480–81. (Mimeographed).

Wheat lines resistant to rust in the seedling stage are generally assumed to be probably also resistant as adult plants. It has however been observed at Beltsville, Md., that Mentana and some of its derivatives show seedling resistance to race 15B of stem rust but susceptibility in the adult stage.

1811. Bayles, B. B., Ward, D. J. and Borlaug, N. E.
Wheats from world collection resistant to rusts.
U.S. Dep. Agric., Agric. Res. Admin., Bur. Pl. Indust. Soils Agric. Engin., Div. Cereal Crops Dis., Pl. Indust. Sta. Beltsville, Md. 1952 : Pp. 4. (Mimeographed).

During recent years many wheats from the world collection maintained by the US Department of Agriculture have been extensively tested in the USA and other countries for their reactions to diseases. The present report presents tables summarizing the results of tests on a large number of wheats at centres in the USA, Canada, Mexico and South America. The data are concerned mainly with reactions to stem and leaf rusts. Reactions to stripe rust and mildew are also included. In addition, the results of tests of seedling response to race 15B of stem rust are recorded. It is emphasized that several varieties susceptible in the seedling stage to 15B were highly resistant to severe epidemics of this race under field conditions. Varieties of bread and durum wheat resistant to stem rust in the 1951 field tests are listed.

1812. Bell, G. D. H., and Lupton, F. G. H.
Yellow rust in wheat. Its significance in wheat cultivation and breeding in England.
J. Minist. Agric. 1952 : **58** : 572–76.

Attention is drawn to the dangers of cultivating continental wheat varieties which are susceptible to yellow rust (*Puccinia glumarum*); it is emphasized that use of resistant varieties offers the only effective means of controlling the disease. An account is given of tests of the seedling reactions of varieties and hybrids to different races, recently carried out at the Cambridge Plant Breeding Institute. Seedlings showing resistance have been found to remain

resistant at all later stages of development. The rust reactions of F_2 hybrid populations and of their parents have proved to be closely related; the genetic basis of reaction to yellow rust is not however simple.

1813. Ahmed Afifi.
Production of rust-resistant *vulgare* wheats by backcrossing.
Nature, Lond. 1952 : **169** : 200–01.

The wheats Moktar and Giza 139, which both show some susceptibility to *Puccinia graminis* var. *Tritici* in Egypt, were crossed. The F_1 was back-crossed with Giza 139 as male. An F_3 family obtained from this back cross has shown a high degree of seedling and adult plant resistance to all races of stem rust so far discovered in Egypt.

1814.
Festival—new wheat variety bred by Department.
Agric. Gaz. N.S.W. 1951 : **62** : p. 582.

Festival, a new rust resistant wheat bred by the New South Wales Department of Agriculture, has been added to the list of registered varieties; it is being increased for distribution in northern and western districts.

1815. Pesola, V. A. and Kivi, E.
Svartrostens (*Puccinia graminis*) skadegörelse på vårvete senaste sommar. (**Damage by black rust (*P. graminis*) to spring wheat last summer**).
Tidskr. Lantm. 1952 : **34** : 17–19.

The relation between earliness and black rust damage and yield is among the points considered in this discussion on the resistance of Finnish and Swedish wheats in Finland. The Finnish varieties Apu, Tammi, Kiuru and Sopu surpassed the Swedish wheat Diamant [Diamond] owing to their earliness.

1816. Lukjjanenko, P. P.
(Two new varieties of wheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 9 : 32–35. [Russian].

Kubanskaja 131 [Kubanj 131] and Kubanskaja 133 are two rust resistant lines resulting from a cross between the American variety Kanred-Fulcaster 266 287 and hybrid 622 from north Caucasus. Kanred-Fulcaster, imparting resistance to rust at the vernalization phase, was chosen as the ♀ parent; Hybrid 622, which imparts resistance after the light phase has been passed, supplied the pollen. Kubanskaja 131 and Kubanskaja 133 are more resistant than either parent and outyield the standard north Caucasian varieties, Novoukrainka 83 [New Ukrainian 83], Vorošilovskaja [Vorošilov] and Krasnodarka [Krasnodar]. Furthermore, Kubanskaja 131 sheds its grain much less readily than Vorošilovskaja, though it is a little less hardy, and the grain of Kubanskaja 133 has better milling and baking qualities than that of Krasnodarka.

1817. Massenot, M.
Observations et expérimentations récentes sur la rouille noire du blé. (**Recent observations and experiments on black rust of wheat**).
Bull. Techn. Inform. Ingén. Serv. Agric. 1951 : No. 58 : 255–59.

In this progress report on the work at the National School of Agriculture, Grignon, on black rust resistance in wheat, special mention is made of the qualities and performance of the complex hybrid GN (cf. *Plant Breeding Abstracts*, Vol. XIX, Absts. 2432 and 2433) among the many varieties in the trials. Other hybrids regarded as of interest are GN x Dômes and (GN x Yga) x Yga, both of which, however, have certain defects, including susceptibility to yellow rust.

1818. Callenbach, J. A.
Rescue wheat and its resistance to wheat stem sawfly attack.
J. Econ. Ent. 1951 : **44** : 999–1001.

Results of field tests with Rescue wheat at Choteau, Mont., to determine factors responsible for variations in degree of damage caused by sawfly, have shown that resistance is correlated with solidity of the stem. The tunnelling capacity of the larvae is limited in very solid tissues and damage may be restricted to a single internode. It is suggested that the degree of tunnelling in the second internode may provide an index of resistance for purposes of selection.

1819. Fumelli, A.
Prepariamoci a tempo per la nuova campagna granaria. (**Let us prepare in time for the new wheat season**).
Agricoltura Tosc. 1951 : **6** : 359–62.

Italian varieties are recommended for growing in the plains of Italy and the following newer varieties are singled out as having given good results in preliminary trials and demonstration plots: Marchetti 102, Race B, Race C, Trento

and Race P, bred by Avanzi; and Freccia, Mara and Rondine, bred by Michahelles.

1820. Brun, L. H.
Forsøk med vårkveitesorter 1935–1948 og forsøk med vårkornsorter 1936–1948. (**Experiments with spring wheat varieties 1935-1948, and experiments with spring grain varieties, 1936-1948**).
Forskning Forsøk Landbruk., Oslo 1951: **2** : 221–62.

Trials of 51 Norwegian and other varieties of spring wheat at the Voll Experimental Station in Norway are recorded in detail, as well as the results obtained with 17 varieties which were also tested in local trials. Notes are included on the main characteristics, origin and performance of some varieties bred at the Voll station or other Norwegian Experimental Stations. The three most promising spring wheats are Snøgg II [Rapid], Ås II, Skirne and possibly Fram II. The first three have very strong straw; Snøgg II ripened 6–7 days earlier than the other three, but like Skirne tends to shed. In the spring cereal trials, varieties of spring wheat, oats and 2-rowed and 6-rowed barleys were compared with reference to grain yield and to feeding units calculated for grain and straw.

1821. Strand, E.
Sortforsøk med høsthvete på Sör-Østlandet i 12-års perioden 1937/38 til 1948/49. (**Variety trials with winter wheat in south-eastern Norway during the 12 years' period 1937/38 to 1948/49**).
Meld. Norg. LandbrHøgsk. 1951 : **31** : 1–22.

This report, which provides a continuation of Vik's previous studies (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 120), records the performance of many Norwegian wheats and some Swedish varieties tested at the Vollebekk Experimental Farm and on various outlying experimental fields in Sör-Østland, Norway. Though superior in actual yielding capacity and possessing stiff enough straw the Swedish varieties, owing to inadequate winter hardiness in some districts and years, were surpassed by the local wheats.
Two new lines of Th. 0102 x Sol [Sun], namely Follo and 012, from the Agricultural Technical Institute at Vollebekk gave the highest average grain yield, for all fields, exceeding the control Th. 0102 by 14 and 12 kg. per dek. respectively. Enger came next. For districts where a combination of overwintering capacity, stiff straw and earliness is required Sigyn is recommended.

1822. Fajersson, F.
Huru Pondus hävdat sig inom olika avkastningsklasser. (**How Pondus has done in various yield classes**).
Weibulls Ill. Årsb. 1951 : **46** : 8–10.

Fajersson, F.
Pondusvårvetets bakningskvalitet. (**Baking quality of Pondus spring wheat**).
Ibid. 1951 : **46** : 25–29.

In the first paper notes on the main characteristics of Pondus wheat are accompanied by yield statistics for 1949 and 1950, showing its superior performance as compared with Brons [Bronze], Kärn II [Kernel II], Ella and Progress. The second paper deals with factors conducive to good baking quality, with particular reference to Pondus, Brons, Kärn II, Diamant II [Diamond II] and Progress.

1823. Eliasson, S. and Jacobson, G.
Sortförsök med vårvete. Sammanställning av resultaten av de av statens jordbruksförsök ledda sortförsöken med vårvete under åren 1940 (1935)–1948 (1950). [**Variety trials with spring wheat. A collocation of the results of the spring wheat variety trials conducted during the years 1940 (1935)-1948 (1950) by the National Agricultural Research Centre**].
Medd. Stat. Jordbruksförsök, Stockholm 1951 : No. 32 : Pp. 116.

The majority of the wheats tested were bred at the Svalöf or Weibullsholm institutes, but some Finnish and Norwegian varieties grown in Sweden were also tested. The origin and main characteristics of the varieties are given in a section preceding the detailed record of performance in the regular experiments made by local societies, in tests on official experimental farms and in the regular trials at experimental stations and experimental fields of the National Agricultural Research Station of Sweden. A regional map, a pedigree chart of Swedish, Finnish and other wheats with other tabulated data and a bibliography of Scandinavian literature on spring wheats complete the report (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 734).

1824. Broekhuizen, S. and de Miranda, H.
De bakwaarde van de in Nederland verbouwde tarwerassen. (**The baking value of the wheat varieties grown in the Netherlands**).
Landbouwk. Tijdschr., Wageningen 1951 : **63** : 776–88.

Varietal differences in baking value in the 1947–49 wheat crops are recorded with special reference to suitability for bread making.
The baking tests of the wheats from the harvests of 1947 and 1949 confirmed the view that, in general, high grain yield is not accompanied by good quality of the gluten.

1825. Fajersson, F.
Pondusvårvetet under olika årgångar. Från försöken på Weibullsholm. (**Pondus spring wheat in various years. Experiments at Weibullsholm**).
Weibulls Ill. Årsb. 1952 : **47** : 3–6.

Comparisons with Kärn II [Kernel II] during seven years and with Brons [Bronze] during five years showed Pondus to be superior to both in yield. Kärn II and Brons had, however, a higher protein content, where conditions were the same. Nevertheless, allowing for its higher yield per ha., Pondus would be the more profitable variety to grow under conditions at Weibullsholm, in spite of the higher volumetric weight and protein content of Kärn II. On other soils and where earliness is the prime consideration Kärn II or Diamant II [Diamond II] is recommended.

1826. Åkerman, Å. and Mac Key, J.
Svalöfs Fylgiavårvete II (0972 c). Ny sort av Fylgiatyp. [**The Svalöf spring wheat Fylgia II (0972 c). A new variety of the Fylgia type**].
Sverig. Utsädesfören. Tidskr. 1951 : **61** : 342–46.

This long-strawed wheat with brownish ears is a sister strain of Fylgia I (Extra Kolben x Aurore) and has outyielded it by 1·5–2% and has also stiffer straw, a higher hectolitre weight and superior baking value. Kärn II has surpassed Fylgia II in yield, but the latter shows superior drought resistance.

BUCKWHEAT

1827. Krotov, A. S.
(**The principal methods of obtaining hybrid seed of buckwheat**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 8 : 60–63. [Russian].

In breeding experiments with buckwheat at the USSR Institute of Plant Industry, a method consisting of sowing two varieties in alternate rows and involving the elimination of long-pistilled plants in one variety and short-pistilled plants in the other, produced the most marked heterosis.
Similar heterotic effects were produced by sowing mixed seed of two varieties in the same field. The least significant yield increases resulted from sowing the seed of a female parent variety in alternate rows with one or several other varieties.
It is thought that heterosis might be maintained longer in material obtained by sowing mixed seed of two varieties than in the progenies derived from crosses between long-pistilled and short-pistilled plants of two varieties, although initially the latter method gave a higher percentage of hybrid seed.
In the Leningrad province, mixed seed of Kazanskaja [Kazanj] + Bogatyrj [Hero] was more productive than Kazanskaja + Terehovskaja or Bogatyrj + Serebristaja [Silver] and Bogatyrj + Boljševik [Bolshevik]. Terehovskaja + Bogatyrj proved the most productive material in the Mogilev province.

1828. Taylor, J. W. and White, J. W.
The growing of buckwheat for rutin.
Crops in Peace and War. Yearb. US Dep. Agric. 1950–51 : 751–52.

The chief results of experiments on growing buckwheat for rutin production in the USA are outlined, with reference to the value of different species and varieties. A colchicine-induced tetraploid form of *Fagopyron tataricum*, produced at the Plant Industry Station, Beltsville, Md., consists of leafy plants and in preliminary tests has given high yields of rutin.

1829. McGregor, W. G. and McKillican, M. E.
Rutin content of varieties of buckwheat.
Sci. Agric. 1952 : **32** : 48–51.

In tests at the Central Experimental Farm, Ottawa, Canada, varieties of *Fagopyron esculentum* and *F. tataricum* showed no significant differences in percentage rutin content. Seasonal differences in rutin content were however highly significant. Tested for one year only, a tetraploid of *F. esculentum*, CD 5044 from Sweden, did not appear more promising than the usual varieties.

OATS

1830. Nicholson, G.
Oat and barley varieties recommended for 1952 sowings.
Agric. Gaz. N.S.W. 1951 : **62** : 621–24.

Oat and barley varieties recommended for different districts in New South Wales are listed. Descriptions of recommended oat varieties are included. Information is also provided on the following new oats: Acacia (cf. Abst. 309); Berger, an introduction from Argentina; Brigalow, closely resembling Algerian; Gidgee; and Orient (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 160).

1831. Beliz, J. M. and Folque, N. de B.
Novas formas cultivadas de aveia. Classificação e descrição sumária. (**New cultivated forms of oats. Classification and brief description**).
Melhoramento, Elvas 1951 : **4** : 67–74.

Brief descriptions are given of four oat selections made by the Plant Breeding Station at Elvas in Portugal, all of which have become popular among cultivators. They are Aveia da Graça [Grace Oat] and Santa Maria, both varieties of *Avena byzantina*, and S. Francisco and Santa Luzia, varieties of *A. sativa*.

1832. Hagberth, N. O.
Sisuhavre. (**Sisu oats**).
Weibulls Ill. Årsb. 1952 : **47** : 16–17.

Bred at the Hankkijas Plant Breeding Institute at Tammisto, Finland, from a cross of the white oat Vasa with the black oat Tammisto 02272, Sisu was put on the Finnish market in 1948 and has now outyielded all other varieties in Finland and surpassed Guldregn II [Golden Rain II] by about 10%. In tests at Weibullsholm with seed imported in 1946 it has again surpassed Guldregn II and, in some cases even Sol II [Sun II]. Its straw is exceptionally strong, surpassing all other varieties on the Swedish market except Bambu II [Bamboo II]. It ripens at the same time as Sol II.

1833. Hagberth, N. O.
Weibulls Original Bambuhavre II. (**The Weibull oat Bambu II**).
Weibulls Ill. Årsb. 1951 : **46** : 14–16.

This line selection (W 14535) from Bambu has equalled Guldregn II [Golden Rain II] in Swedish official trials, exceeding its parent variety in grain yield by 5·7%. The corresponding figure in trials at Weibullsholm was 4%. Its fine white grain is of particularly good quality with a higher hectolitre weight and a lower husk percentage than Guldregn II, which it also surpassed by 3–4 days in earliness at Weibullsholm. It had also stiffer straw than Bambu or Sol II [Sun II]. It is recommended for use in southern Norrland.

1834. Nishiyama, I.
(**The occurrence of a steriloid type in oats and its abnormal inheritance**).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 39–40. [Japanese].

A 28-chromosome line was isolated from a later generation of the cross *Avena barbata* (carrying chromosomes a'_5 and perhaps a_5) and *A. strigosa* (carrying chromosome a_5). This segregated into approximately equal numbers of wild type oats ($a_5a'_5/a_5a'_5$) and steriloids ($a_5a'_5/a_5a_5$). Lethal factors are believed to eliminate homozygous steriloids. A few oats of the cultivated type appeared in advanced generations. The deviations from Mendelian ratios are probably due to segmental interchange.

1835. Frey, K. J.
Variations in the protein and amino acid contents of different oat varieties.
Cereal Chem. 1952 : **29** : 77–81.

Analyses of the average protein content and percentage of lysine, leucine, methionine and tryptophane of 14 varieties grown at East Lansing, Mich., in 1947 and 1949 showed that variations in environmental conditions from year to year influenced the total protein content and changed the proportions of certain amino-acids. The percentage of tryptophane remained most constant, particularly in Mindo and Andrew. Those oats having a high percentage content of leucine or lysine under one set of environmental conditions tend to maintain these high percentages in a different environment.

1836. Bernhard, R.
Caractères des lodicules d'avoine. Leur utilisation dans la détermination des variétés. (**Characteristics of the lodicules of oats. Their utilization in the determination of varieties**).
Ann. Inst. Nat. Rech. Agron. 1951 : **1** : Ser. B : 355–66.

The length of the lodicules and presence or absence of teeth are shown to be valid characters in distinguishing oat varieties.

1837. IVANOFF, S. S.
The use of activated oat seeds in the study of winter-hardiness.
Bot. Gaz. 1951 : **113** : 90–94.

Seeds of four varieties were soaked in running water for 20 hours at 25° C and frozen for 7 days at −6°, −8°, −18° and −30° C. The responses of the different varieties, as shown by survival data, agreed with those reported for seedlings and mature plants in field trials. Both length of soaking period and temperature of the water affected percentage survival. Millions of seeds activated by soaking at 25–27° C for 20 hours were frozen at −30° C for a week or longer. The progenies of the plants produced from the very few seeds able to survive this treatment are to be subjected to low temperatures in the field at various stages of growth. Two of these plants showed a considerable extension of the life span; a few others were remarkable for their greatly increased bud development and tendency to tiller.

1838. JONES, E. T. and GRIFFITHS, D. J.
Varietal resistance and susceptibility of oats to powdery mildew (*Erysiphe graminis*).
Trans. Brit. Mycol. Soc. 1952 : **35** : 71–80.

Varieties and selections of *Avena sativa* and other species have been studied at the Welsh Plant Breeding Station, Aberystwyth, for their reaction to powdery mildew under conditions of natural infection in the field and cool greenhouse. Most of the varieties and selections tested, including all the varieties grown commercially in Britain, exhibited susceptibility. In seasons of mild infection a number of selections exhibited a fairly high degree of resistance in both the seedling and adult stages under field conditions. Four of these selections, all derived from a cross between selections from Victory x Red Algerian and Red Rustproof x Record, also exhibited a moderate degree of resistance in the seedling stage and a fairly high level of resistance in the adult stage under greenhouse conditions. Three other samples with a high degree of resistance were identified in the greenhouse tests: Cc 4146, an unidentified hexaploid believed to have been derived from a natural cross of *A. sativa* x *A. Ludoviciana*; Cc 4093 (*A. strigosa* var. *glabrata*); and Cc 3678 (*A. strigosa* ssp. *hirtula*). The considerable variations in the stability of reaction to infection shown by the different hosts suggested that the problem of whether physiological races exist should be investigated. In each of the crosses Cc 4146 x R 464 (Marvellous x Green Russian-Bond) and *A. strigosa* x *A. brevis* reaction to the disease was governed by a single factor pair.

1839. POOLE, D. D. and MURPHY, H. C.
Reaction of oat varieties to black stem and to a toxic substance produced by the causal organism.
Phytopathology 1952 : **42** : p. 16. (Abst.).

Information is given on the reaction of several varieties to black stem (*Leptosphaeria avenaria*). Resistance is probably conditioned by multiple genes.

1840. ROSEN, H. R.
Intermediate reaction to race 45 of crown rust, and rust-escaping qualities exemplified in the new Bond derivative, Arkwin.
Phytopathology 1952 : **42** : p. 17. (Abst.).

In addition to the usual reactions of Bond derivatives to race 45, at least two other types have been observed under field conditions: an intermediate type comparable with the reaction of some derivatives of the oat Victoria; and a rust escaping or klendusic type comparable with the responses of Red Rustproof strains to race 1 in the field. Arkwin is among the varieties exhibiting the latter type.

1841. FINKNER, V. C.
Genetic factors governing resistance and susceptibility of oats to *Puccinia coronata avenae* Eriks. et E. Henn., race 57.
Iowa St. Coll. J. Sci. 1952 : **26** : 201–02. (Abst.).

Genotypes comprising various combinations of six factors *K*, *M*, *U*, *V*, *L* and I_k, controlling reaction to crown rust race 57 are proposed for 8 varieties grown at the Iowa Agricultural Experiment Station on the basis of F_2 analyses of 23 of the possible 28 intervarietal crosses. Susceptibility to *Helminthosporium Victoriae* was dominant and incompletely linked with a gene, designated *V*, governing resistance to crown rust race 57. Although Ukraine carries the two dominant linked factors *M* and *U*, determining resistance to race 57, it proved susceptible to an unknown race of crown rust; susceptibility to the latter may be associated with either *M* or *U*.

1842. JENSEN, N. F.
Intra-varietal diversification in oat breeding.
Agron. J. 1952 : **44** : 30–34.

The practice of recommending only a few varieties for wide acreage in the US is discussed

with reference to the possible evolution of new races of pathogens, especially of crown and stem rusts, which are able to spread rapidly through vast regions when insufficient genetic differences exist between varieties. Some protection from epidemics may be achieved by certifying a large number of genetically distinct oats from which adequately diverse varieties may be selected at random. Greater diversification by use of a multiline variety to supplement pure lines is suggested. Such a variety, consisting of a blend of genetically diverse pure lines each contributing desirable genetic factors without detracting from the phenotypic uniformity of the composite, would theoretically possess the characteristics of lasting popularity, stability of production, adaptation to numerous environments and an adequate buffer system against any one disease.

1843. MOSEMAN, J. G.
Colletotrichum graminicolum (Ces.) Wilson on _Avena_ species.
Iowa St. Coll. J. Sci. 1952 : **26** : 253–54. (Abst.).

At the Iowa Agricultural Experiment Station a form of *A. strigosa* known as Saia was the only immune type among many varieties of 12 species of *Avena* inoculated with 12 cultures of *C. graminicolum* obtained from different parts of the USA. Saia also proved resistant to crown and stem rusts at Ames and Kanawha during 1949. Sixty oat varieties from the Iowa breeding nurseries and 19 varieties from the Uniform Rust Nursery showed different degrees of susceptibility to *C. graminicolum;* although Victoria proved more resistant than other varieties, hybrids from Victoria x Richland were highly susceptible. None of the 12 cultures was able to infect the barley Trebi or Moore or the wheats Pawnee and Iohardi. There were insufficient differences in the pathogenicity of the 12 cultures of *C. graminicolum* to distinguish physiological races.

1844. IVANOFF, S. S.
Mass screening in oat breeding. A seed laboratory method for testing resistance of oats to Victoria blight.
J. Hered. 1951 : **42** : 225–30.

Varietal reaction to *Helminthosporium Victoriae* can be determined within one week, before or soon after germination, by placing seed coated with an agar culture of the pathogen between wet rags which are rolled and maintained in 100% relative humidity at 25–30° C. In tests at the Mississippi Agricultural Experiment Station 9 susceptible varieties failed to germinate whereas 9 resistant varieties showed normal development of radicles and plumules. This method is recommended for testing large quantities of seed, or for selecting resistant individuals from progenies showing segregation.

1845. DERSCHEID, L. A.
Responses of barley and oats to 2, 4-dichlorophenoxyacetic acid.
Iowa St. Coll. J. Sci. 1952 : **26** : 194–95. (Abst.).

Data concerning the response of 10 varieties of oats and 9 barley varieties to 3 forms of 2,4–D at 4 stages of growth indicate that, although minimum injury is caused by applications made between the five-leaved and early boot stages, Wisconsin 38 barley and Mindo, Clinton and Marion oats are highly susceptible to the butyl ester. All 4 varieties show morphological abnormalities and yield reductions after treatment.

1846. Foreløbig meddelelse om forsøg med havresorter 1949–1950. **(Preliminary communication on trials with varieties of oats, 1949-50).**
Tidsskr. Planteavl 1951 : **55** : 177–80.

Yield trials on different types of soil and at 11 different places in Denmark were carried out on seven Danish-bred varieties including Pajbjerg Rex A, Borris Opus II, Palu, and three from Svalöf. Notes are given on the origin and performance of the varieties.

RYE

1847. DMITRIEV, V. S.
(The primary source of origin of _Bromus secalinus_ and measures for its liquidation).
Agrobiologija (Agrobiology) 1951 : No. 6 : 6–15. [Russian].

Experiments conducted at Gorki Leninskie and at the Institute of Genetics of the USSR Academy of Sciences support the Mičurinite thesis that a species may change into another as a result of external conditions. In the present instance conversions of rye into *Bromus secalinus* and of *B. secalinus* into rye are claimed. The rye variety was Mestnaja Velikolukskaja [Local Velikie Luki], which normally contains a high percentage of hulled seed of the *B. secalinus* type.

1848. Müntzing, A. and Lima-de-Faria, A.
Pachytene analysis of a deficient accessory chromosome in rye.
Hereditas, Lund 1952 : **38** : 1–10.

The "standard" fragment occurring in some rye plants undergoes a directed nondisjunction in the first division in the pollen grain, both chromatids passing to the generative nucleus (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1238). The large isofragment derived from the standard fragment retains the ability to undergo nondisjunction, whereas the small isofragment and so-called deleted fragment (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2207) derived from the standard fragment do not show this phenomenon. Study of the deleted fragment has revealed that this type results from loss of the entire terminal half of the long arm of the standard fragment. The segment missing in this type does not involve the particular segment in the long arm close to the centromere, which was supposed to be primarily responsible for the nondisjunction shown by the standard fragment and large isofragment. Thus the occurrence of nondisjunction must be due to some other factor.

1849. Mori, T.
(Experimental observations on the behaviour of supernumerary chromosomes in "twin" plants of rye).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : p. 32. [Japanese].

Meiosis was studied in vegetatively increased clones of two plants carrying supernumerary chromosomes; the clones were grown at room temperature with watering, at room temperature without watering and in the open. A differential response between the clones in respect of the behaviour of the extra chromosomes and as regards micronucleus formation is noted.

1850. Suhobrus, F. E.
(Winter rye at the Mironovskaja State Breeding Station).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 8 : 51–53. [Russian].

Breeding work to improve Taraščanskaja T–2 rye is reported. Appreciable yield increases were obtained by pollination of the most productive families with the best cultivated and local varieties. The effects of hybridization upon productiveness and vigour were more marked in the second and third than in the first year.

1851. Bogomolov, A. M.
(The use of large seed for the breeding and propagation of rye).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 6 : 52–53. [Russian].

Plants grown from selected large seeds of Benjakonskaja rye, sown in the autumn of 1947, were pollinated by various types of Vjatka and Benjakonskaja ryes grown under a range of conditions. The largest hybrid grains were again selected and sown in the autumn of 1948; F_2 seeds from these plants proved bigger and heavier than seeds formed by cross-pollinated plants grown from unselected seed; seed yields produced by selected individuals were also greater than those given by the latter.

1852. Varlamov, A. A. and Znamenskiĭ, A. A.
(Perennial rye as a forage crop in Rostov province).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 7 : 77–79. [Russian].

A variable population of perennial rye has been produced at the Stavropoljsk experimental station. Plants differing in morphology and growth habit and reacting variously to their environment occurred.
After seed was sown in the autumn of 1948, a large proportion of plants died during the ensuing seasons, but by the end of 1951 the plants which survived had vigorous foliage and roots. It is therefore suggested that the proportion of perennial plants with numerous tillers could be increased if seed were collected during the second and third cropping season, the plants persisting beyond this period being persistent and vegetatively vigorous, and therefore most suitable for grazing and hay.

1853. Ognev, I. M.
(A high-yielding variety of winter rye).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 6 : 33–35. [Russian].

The hardy varieties Vjatka and Novozybkovskaja 4 both give high yields of grain, but are liable to lodging. Petkus, although not hardy, has a large grain and does not lodge. Cross pollination between these varieties resulted in a high yielding, large-grained, nonlodging rye, adaptable to a wide range of soils in Belorussia, where it is hardy and resistant to drought. The new rye, called Partizanskaja Mestnaja

[Partizan Local], has a medium maturation period and has good milling and baking qualities.

1854. PICHLER, F.
Über die Prüfung von Roggensorten auf ihre Anfälligkeit für Schneeschimmel (*Fusarium*). [**On the testing of rye varieties for their susceptibility to snow mould (*Fusarium*)**].
PflSch. Ber., Wien 1952 : **8** : 33–43.

Varietal resistance to snow mould is investigated as follows. The variety is first tested for susceptibility of the grain in an area where atmospheric humidity is frequently 100%. Secondly, the variety is tested for seedling susceptibility in the laboratory or greenhouse, or under natural conditions in which snow lies on the ground for a prolonged period.

MAIZE

1855. SINGLETON, W. R.
Effect of continuous gamma radiation on mutation rate in maize.
Genetics 1951 : **36** : p. 575. (Abst.)

The frequency of γ-induced mutations affecting four endosperm characters determined by *R, Pr, Su* and *Sh* was studied in progeny derived from a multiple recessive *A b pl C r pr su sh* fertilized by pollen from the dominant stock *A B Pl C R Pr Su Sh*; both parents were grown under continuous radiation of varied intensity. Induced mutation rate showed no increase over spontaneous mutation rate when radiation was less than 5 r. per day, but increased radiation intensities up to 125 r. per day produced increasing mutation frequencies; the logarithm of the mutation rate showed a linear relationship with dosage. Although *R* showed the highest frequency of spontaneous mutations, the relative increase in mutation frequency induced by γ rays was smaller for *R* than for either *Su, Sh* or *Pr*.

1856. Schweiz. landw. Mh. 1952 : **30** : 3–37.

Wagner, S. Zum Geleit. (*Introduction*). (*pp. 3–5*).

Reference is made to the part played by FAO in stimulating maize cultivation in Europe in postwar years and to the meeting of the Association of Maize Breeders in Europe and the Near East held at Zürich on 5–9 February 1952, at which the following contributions were presented.

Popow, G. Der Maisanbau in der Schweiz. (*Maize growing in Switzerland*). (*pp. 6–11*).

In the Ticino basin zone of Switzerland the hybrid Ohio M34 has given yields of 38% in excess of Nostrano dell'Isola. In the Rhine basin Wisconsin 255 has given the best results and though it has excelled the local variety materially only in drought years, it has proved more resistant to rust and lodging.
Certain changes in husbandry involved in the changeover to hybrid maize are mentioned.

Silow, R. A. The FAO hybrid maize programme in Europe and the Mediterranean area. (*pp. 11–14*).

Cooperative tests organized in 23 European and Near Eastern countries by FAO since 1947 have confirmed that many maize hybrids imported from Canada and the US are inferior to locally grown varieties. A few introductions, which have outyielded local varieties and shown a high degree of lodging resistance and ability to withstand adverse conditions, are being widely grown in several countries; the inbred parents have also been imported so that these hybrids can be produced locally.
Breeding work in progress to develop inbred lines adapted to the particular environmental conditions of each country is briefly outlined, with reference to cooperative trials of inbred lines of both European and Near Eastern origin.

Jenkins, M. T. Hybrid maize in the U.S.A. (*pp. 15–20*).

The development of hybrid maize breeding in the US is briefly traced, to show how the progress achieved by isolated breeding stations was rapidly increased by cooperation and interchange of inbred lines, and to emphasize the importance of international cooperation promoted by FAO among European maize breeders.

Fenaroli, L. La coltivazione del mais in Italia. (*Maize cultivation in Italy*). (*pp. 21–24*).

A general outline is given of the conditions of maize growing in different parts of Italy and mention is made of some of the most popular local varieties; several hundred of these exist but their place is gradually being taken by hybrid maize. The best hybrids for the respective zones are indicated. Yields of up to 100 quintals per ha. are becoming more and more frequent.

Becker, W. R. Aspekte und Probleme des Maisbaus in den Niederlanden. (*Aspects and problems of maize cultivation in the Netherlands*). (*pp. 25–29*).

Advantages and disadvantages of maize cultivation under Netherlands conditions are discussed. Quick early development and early maturity are essentials in any successful variety and hybrids have been made between suitable

American inbreds and the earliest Dutch selections from German maize varieties. One of these hybrids, named Goudster, exceeded all American hybrids in both earliness and yield in 1950 and 1951.

Special measures adopted to ensure the purity and quality of seed of these hybrids are described. Four private seed firms as well as the state breeding institute are carrying on breeding work with maize.

Alabouvette, F. Situation et tendances de la culture du maïs grain en France. (*Present position and tendencies in maize cultivation for grain in France*). (*pp. 30–33*).

Information is given on the extent and distribution of maize cultivation in France before and after the war, when a great stimulus was given by the introduction of American hybrids of the Wisconsin 240 type. These hybrids proved more productive than local selections of corresponding maturity ratings and 20 of them have now been entered in the catalogue of varieties recommended for different regions. Selections from local populations will soon be ready for use as parents.

Sprenger, J. J. I. Grundsätzliche und praktische Fragen der Maistrocknung. (*Fundamental and practical questions concerning maize drying*). (*pp. 34–37*).

The methods of drying used in the Netherlands are described.

1857. Suto, T. and Kato, Y.
(Gene analysis in maize. I. On the linkage relations of new genes).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 48–49. [Japanese].

The following linkages are reported: v_{21} (virescent seedling), on chromosome VIII, with *J*, the cross over value being 32–41%; v_{22} (virescent seedling), II, with lg_1, 27–39%; ys_3 (yellow stripe), VII, with *ij*, 19%, and with *ra*, 30%; gs_3 (green stripe), II, with lg_1, 4%; li_2 (lineate leaf), X, with *g*, 47%; ad_4 (adherent), II, with lg_1, 33 and 39%; ad_5; (adherent), V, with bm_1, 31%, and with V_2, 28%; ad_6 (adherent), X, with *J*, 32%; ad_7 (adherent), with d_{10}, 17%; an_3 (anther ear), II with *lg*,* 40%; *ma* (maculata), on VII, with *ij*, 36%, and with *gl*, 37%, and on IV, with *su*, 14%, and with *la*, 13%; *og* (old gold stripe), X, with *g*, 21%; and dm_2 (dead leaf margin), V, with *bm*,† 45%.

1858. Suto, T.
(Gene analysis in maize. II. On the inheritance of 3 new recessive characters.)
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : p. 49. [Japanese].

Two new recessive characters, ts_6 (tassel seed) and ra_3 (ramosa ear), are described. A triplicate set of genes, bl_3, bl_4 and bl_5, determining blotched leaf, were also discovered; bl_3 is linked with *sh-wx*, and bl_4 with *Y*.

1859. Suto, T.
(Gene analysis in maize. III. Abnormal types of segregation resulting from two particular dominant genes).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 49–50. [Japanese].

Two instances of disturbed segregation ratios are described: (1) a case affecting the gene *gi* owing to linkage with the lethal factor *Lt*; and (2) an aberrant cross over value involving genes *Ga* and *sh* in linkage group 9.

1860. Suto, T.
(Gene analysis in maize. IV. On the nonlethal character of the *Tp* gene when present in the homozygous dominant form).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 50–51. [Japanese].

The B type of teapod maize produces insufficient pollen for selfing, but after open pollination, an F_1 generation composed of C and D teapod types was obtained. These, on selfing gave normal, C + D teapods, and B teapods, in a ratio of 1 : 2 : 1 respectively. On back-crossing the F_1 to normal maize, a 1 : 1 ratio of normal to C + D teapods was obtained. These results are interpreted as showing that the B teapod type is the homozygous dominant (*Tp Tp*), while the C and D teapods are heterozygous (*Tp tp*).

1861. Matsuura, H. and Suto, T.
(Gene analysis in maize. V. The genetic behaviour of the calico character).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : p. 31. [Japanese].

Calico pigmentation, as distinct from golden or white pigmentation, appears to be determined by a mutant gene situated on chromosome 8.

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* ? lg_1. † ? bm_1.

1862. LAUBSCHER, F. X.
Hybrid maize in production.
Fmg. S. Afr. 1952 : **27** : 15–18.

The performance of maize hybrids in variety trials and farmers' tests in South Africa is discussed. A substantial increase in yield can be obtained from a suitable hybrid. The results stress the great importance of good cultural conditions and of using only well-adapted hybrids. With the support of the Mealie Industry Control Board, breeding on hybrid maize is being expanded or initiated at several experimental centres.

1863. **Virginia develops two new hybrids.**
Seed World 1952 : **70** : No. 1 : p. 22.

The characteristics of the maize hybrids VPI 645 and VPI 802 are described. An important advantage of both hybrids is their high degree of resistance to stalk rot and leaf blight.

1864. KRAMER, N. W.
An evaluation of the effectiveness of visual selection during inbreeding in corn.
Abstr. Doct. Diss. Ohio Univ. 1952 : No. 62 : 127–33.

Visual selection for various characters was found to be effective in increasing the general desirability of successive inbred progenies of maize, as shown by the results of top cross tests. The inbred families were developed from single crosses. The data indicate that top crossing of inbred progenies derived from such hybrid sources should be delayed until at least the S_5 generation. Three reasons are given for this conclusion: (1) progenies can be more efficiently eliminated on the basis of characters other than yield by the utilization of visual selection in the pedigree method than by testing in top crosses; (2) the range of variability may be lower in the early generations; and (3) selection and chance assortment during inbreeding may result in significant changes in value among the families, even as late as the S_5.

1865. SAUNDERS, A. R.
Recurrent reciprocal selection in maize breeding.
S. Afr. J. Sci. 1952 : **48** : p. 211. (Abst.).

As a result of investigations at the Natal Agricultural Research Institute, Pietermaritzburg, use of a modification of the method of recurrent reciprocal selection is suggested, in which S_1 or S_2 lines instead of S_0 plants are employed in top crosses to determine combining ability. The method is briefly outlined; the main reason for proposing the modification is the relative inefficiency of S_0 plants as indicators of disease resistance.

1866. MELONI, U.
Il comportamento dei mais ibridi in Provincia di Padova. (**The behaviour of maize hybrids in the province of Padova**).
Agric. Venez. 1952 : **6** : 69–74.

Variety trials in 1950 with a dry summer and 1951 with a wet summer showed the superiority of the hybrids over the local Italian varieties, including even the productive local maize Bianco Perla [Pearl White]. The only hybrid to show a slightly lower yield than Bianco Perla was Funk's G 19 (cf. Abst. 1902), which should, however, be noted as the best substitute for the Italian variety Marano Vicentino and as suitable for late sowing and for growing after wheat.

1867. JUNCKER, F.
Erfarenheter av majsodling i Danmark. (**Results of maize cultivation in Denmark**).
Weibulls Ill. Årsb. 1952 : **47** : 22–25.

The possibility of growing hybrid maize as a fodder crop under Danish conditions is discussed with remarks on its cultivation. So far as is known at present, it cannot be grown as a fully ripe crop in southern Scandinavia, as the grain requires expensive machine drying.

1868. **"Jubilee"—new maize hybrid released.**
Agric. Gaz. N.S.W. 1951 : **62** : p. 568.

The late maturing hybrid Jubilee, has been developed at the New South Wales Department of Agriculture for coastal districts north of the Shoalhaven River, where it outyields Victoria; it is vigorous, strong-stalked, yellow-grained and of good quality.

1869. PISAREV, V. E. and ŽILKINA, M. D.
(**Maize in the Moscow province**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 9 : 17–22. [Russian].

Early maturing strains suitable for the Moscow province have been sought among 106 Soviet varieties and 52 foreign introductions on trial in four districts. Minusinka [Minusinsk], Sibirjačka [Siberian] and other Siberian varieties maturing sufficiently early for local conditions were crossed with late maturing maizes capable of producing high yields.
A vegetative hybrid formed by grafting Harjkov white dent maize on a stock of the red-seeded Belojaroe millet bore white grains tinged with pink.

1870. Zucchini, I.
I granoturchi ibridi americani. (**The American maize hybrids**).
Agricoltore Ferrar. 1949 : **53** : 32–34.
A short review is given of the yield increases obtained from growing American maize hybrids in northern Italy (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2213).

1871. Costa-Rodrigues, L.
Comparative studies of commercial and open-pedigree maize hybrids for maturity and yield.
Agron. Lusitana 1951 : **13** : 253–57.
Further Portuguese tests comparing American hybrid maize and a local variety are reported. The hybrids yielded better, were less susceptible to fungous diseases, but suffered more from rodents. The best adapted hybrids were Wis. 641 AA and Wis. 595.

1872. Brown, W. L. and Mangelsdorf, P. C.
The effects on yield and morphology of the addition of teosinte germ plasm to maize.
Genetics 1951 : **36** : p. 544. (Abst.).
Nine selections of varied genotype derived from crosses between teosinte and maize were crossed with four commercial maize inbreds. Comparisions between offspring inheriting different amounts of genetic material from teosinte revealed that reduction in grain yield, reduction in number of nodes and increase in length of internodes occurred with an increasing proportion of genes derived from teosinte.

1873. Stadler, L. J.
Problems of gene structure. I. The interdependence of the elements (*S*) and (*P*) in the gene R^r of maize.
Science 1951 : **114** : p. 488.
Data on mutation rates suggest that the gene elements (*S*) and (*P*) affecting seed and plant colour, respectively, are not independent genes but structurally distinct parts of the genic complex R^r.

1874. Grobman, A.
Selección gamética complementaria como método formativo de variedades sintéticas de maíz. (**Complementary gametic selection as a method for producing synthetic varieties of maize**).
Agronomía, Lima 1951 : **16** : 41–52.
The method proposed is as follows: (1) select S_1 lines of high combining ability as shown in topcross tests; (2) cross each S_1 line with a variety V; (3) self the S_1 x V plants and cross them also with a tester T; (4) at the same time cross the original S_1 plants with T; (5) compare the yields of the (S_1 x V) x T and S_1 x T plants; (6) select the S_1 x V plants giving the best yields when crossed with T, bulk, allow to interpollinate, and multiply by mass selection.

1875. Fabergé, A. C.
Ultraviolet induced chromosome aberrations in maize.
Genetics 1951 : **36** : 549–50. (Abst.).
Ultraviolet light with a frequency of 2537 Å and medium hard X rays induced numerous chromosomal aberrations in maize pollen at the University of Missouri. Those aberrations affecting four dominant genes, *I*, *Sh*, *Bz* and *Wx*, situated on the short arm of chromosome 9, were detected by detailed analysis of mosaics apparent in the endosperm of progenies produced by using the treated pollen to fertilize plants recessive for the four genes. Similar breakages, inversions, translocations, bridges and rings were induced by both types of irradiation.

1876. Randolph, L. F.
Cytological and phenotypical effects induced in maize by rays and the Bikini Test Able atomic bomb.
J. Cell. Comp. Physiol. 1950 : **35** : 103–17.
With respect to retardation of plant growth, mottling of seedlings, partial sterility and production of sectors with deformed leaves and chlorophyll deficiency, plants grown from the most heavily irradiated seed samples from the Bikini test (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2068) were comparable to those grown from seed exposed to X ray doses of 15,000 r. The affected seeds, however, sustained a much higher percentage of lethal mutations than the X-irradiated maize. Relative frequencies of reciprocal translocations, deletions and inversions were similar after both treatments.

1877. Tavčar, A.
O nasljeđivanju broja i smještaja listova kod *Zea Mays* L. (**The inheritance of the number and position of leaves in *Z. Mays* L.**).
Rad. Jug. Akad. Znan. Umj. 1941 : **84** : 77–90. [Croatian].
At Zagreb, the mode of inheritance of the number and position of leaves was investigated. The initial material comprised an abnormal plant with decussate leaves. It occurred in the F_2 from a cross between two normal genotypes. The above plant gave 168 normal plants and eight decussate plants. Material obtained from selfing the latter comprised some plants with

alternate leaves, some with 2, 3, 4 and 6 leaves per node, and plants, which are probably chimeras, with (1) alternate and opposite leaves, (2) three leaves on some nodes and alternate and opposite leaves on others, (3) opposite leaves and whorls of three, (4) opposite leaves and whorls of four, and (5) whorls of three and six leaves.
Gene analysis suggested that the above plants were heterozygous and that the homozygous condition was lethal. More normal progenies were obtained in crosses between material with abnormal position of the leaves and that with normal leaves than in the reciprocal crosses. This is attributed to greater viability of the male gametes carrying the gene for normal position of the leaves.
It is thought that the opposite and whorled leaves were caused by mutation of the gene for normal leaf position, and that the genes for normal insertion of the leaves and genes for 2, 3, 4 and 6 leaves per node respectively might be multiple allelomorphs.
The genes for 2, 3, 4 and 6 leaves per node are regarded as highly mutable. The following symbols are proposed: *In* (Insertion) for normal leaf position; *In* ^{dec} for two leaves per node; *In* ^{tr} for three leaves; *In* ^{q} for four leaves, and *In* ^{s} for six leaves. Several chimeras, bearing opposite leaves or whorls of three on the main stalks but normal leaves on the secondary stalks, were obtained by selfing some plants with opposite leaves.

1878. Schwartz, D.
The interaction of nuclear and cytoplasmic factors in the inheritance of male sterility in maize.
Genetics 1951 : **36** : 676–96.
A full account is given of the investigations forming the basis of the hypothesis that a male sterile condition in maize is controlled by the interaction of a dominant gene for male sterility (Ms_{21}), a dominant suppressor of sterility (S^{Ga}) associated with a gametophytic effect, and a specific type of cytoplasm essential for the expression of male sterility (cf. Abst. 1878).

1879. Schwartz, D.
A case of male sterility in maize involving gene-cytoplasm interaction.
Genetics 1951 : **36** : p. 575. (Abst.)
The inheritance of ♂ sterility in maize at the Oak Ridge National Laboratory, Tenn., was found to be conditioned by interaction of three factors: a dominant gene for ♂ sterility, Ms_{21}; a dominant suppressor of sterility, S^{Ga}, associated with the ♂ gametophyte; and a specific "sterile type" of cytoplasm. Plants with the genic constitution $Ms_{21}ms_{21}s^{ga}s^{ga}$ are ♂ sterile; those which either lack Ms_{21}, carry S^{Ga} or possess "nonsterile" cytoplasm are ♂ fertile. The suppressor gene segregates only when the heterozygote $S^{Ga}s^{ga}$ is used as the ♀ parent.
The inbred line Kys proved to be a homozygous recessive, $ms_{21}ms_{21}s^{ga}s^{ga}$, and other inbreds studied were homozygous dominants, Ms_{21} $Ms_{21}S^{Ga}S^{Ga}$.

1880. Jones, D. F.
The induction of cytoplasmic pollen sterility and the restoration of fertility in maize.
Genetics 1951 : **36** : p. 557. (Abst.).
At Connecticut Agricultural Experiment Station, three different sources of cytoplasmic pollen sterility have been used with equal success to incorporate male sterility in inbred lines by hybridization and successive back crosses to normal plants. Individuals with genes for cytoplasmic sterility masked by factors restoring normal fertility may be maintained in the homozygous condition; when these are crossed with normal fertile lines, carrying neither sterility genes nor genes for pollen restoration, cytoplasmic sterility reappears in the F_2 as a recessive factor. Thus male sterility can be induced by crossing two apparently normal fertile lines.

1881. Rogers, J. S. and Edwardson, J. R.
The utilization of cytoplasmic male-sterile inbreds in the production of corn hybrids.
Agron. J. 1952 : **44** : 8–13.
At the Texas Agricultural Experiment Station inheritance of cytoplasmic ♂ sterility has been studied, using the ♂ sterile strain T x 203 Ms. The latter was derived from a ♂ sterile mutant of the inbred maize Golden June crossed and repeatedly back-crossed to the fertile inbred T x 203; thus T x 203 Ms possesses Golden June cytoplasm and nuclear material from T x 203, which it resembles except for the failure of the anthers to dehisce and the shrunken appearance of the pollen grains.
Data concerning the degree of sterility in single crosses, using T x 203 Ms as the ♀ parent and some 30 inbred lines as pollinators, show that most of the inbreds resemble T x 203 in their effect on the ♂ sterile character, since progenies are completely ♂ sterile. Some inbreds, including K 55, T x 127 C and T x GJ 39, gave rise to fertile single cross offspring. It is suggested that these 3 lines are homozygous for chromogenes capable of overcoming the effect of plasmagenes controlling sterility, thus restoring fertility. Other inbreds produced single

cross progenies containing both fertile and partially sterile individuals; apparently these inbreds are still heterozygous for the chromogenes influencing the ♂ sterile character.

A limited number of double crosses were effected using completely ♂ sterile ♀ parents and pollinators derived from either (*a*) two inbreds capable of restoring fertility or (*b*) only one inbred possessing the factors for pollen restoration. Offspring from (*a*) were completely fertile, indicating that adequate pollen was available; pollen production from (*b*) was sufficient for a normal seed set in most plots.

Further surveys of inbreds for sources of cytoplasmic ♂ sterility and factors restoring fertility are in progress. Attempts are being made to transfer both characters to more inbreds commonly used for producing commercial hybrids, since it appears from results that hybrid production without detasseling will soon be commercially practicable.

1882. Pittenger, T. H.
Methods of determining the effects of certain factors on the degree of pollen abortion in maize.
Abstr. Doct. Diss. Neb. Univ. 1951 : 20–25.

Analyses of percentage aborted pollen in plants heterozygous for translocations leading to formation of rings of four or six chromosomes have shown that pollen abortion is more frequent in inbred populations than among hybrids.

No correlation was found between the degree of abortion and date of planting, type of spikelet, position of anther on the male inflorescence or date of anthesis. Exposure to abnormally high temperatures throughout the growing period, or for five days at the beginning of sporogenesis, significantly increased the percentage of aborted pollen.

1883. Laughnan, J. R.
Reaction sequence in anthocyanin synthesis in maize.
Genetics 1951 : **36** : 559–60. (Abst.).

Anthocyanin synthesis is blocked when one of the three complementary factors, A_1, A_2 and Bz, is present as a recessive. At the University of Illinois, phenotypes associated with the three recessives have been analysed to determine the sequence in which the three factors control anthocyanin synthesis. The doubly recessive $a_1a_1a_2a_2BzBz$ individual is phenotypically like the $a_1a_1A_2A_2BzBz$ plant, indicating that A_1 controls the preliminary reactions. The other double recessive tested, $A_1A_1a_2a_2bzbz$ resembles neither $A_1A_1a_2a_2BzBz$ nor $A_1A_1A_2A_2bzbz$ plants; it is suggested that A_2 or Bz may be capable of transforming an anthocyanin precursor and may also be involved in the alternative reaction leading to the formation of brown pigment when normal anthocyanin formation is blocked by bz or a_2.

1884. Woodworth, C. M., Leng, E. R. and Jugenheimer, R. W.
Fifty generations of selection for protein and oil in corn.
Agron. J. 1952 : **44** : 60–65.

Selection was begun in 1896 on a foundation seed stock of the maize variety Burr White. For 28 generations ear-to-row selection was practised; for the remaining 22 generations mass selection and controlled intrastrain cross pollination were employed. Four selected strains were established; Illinois High Oil, Low Oil, High Protein and Low Protein. The original variety had a mean oil content of 4·70% and mean protein content of 10·92% in 1896. After 50 generations of selection, the mean oil contents of Illinois High Oil and Illinois Low Oil were 15·36% and 1·01% respectively; the mean protein contents of Illinois High Protein and Illinois Low Protein were 19·45% and 4·91% respectively. Selection is apparently still effective in the High Oil and Low Protein strains; little progress has however been achieved during the last 15 or 20 generations of selection in High Protein and Low Oil. Variability, measured by either the coefficient of variability or the Weinberg formula, has remained virtually unchanged in High Oil; the coefficient of variation in Low Oil has increased markedly but the constant W has shown little change. High Protein has exhibited an increase for both determinations of variability, whereas Low Protein has undergone a decrease. When subjected to random breeding for the period 1934–41, all four strains tended to revert to the composition of the original variety. The results from two generations of reverse selection, begun in 1948, indicated that High Oil, High Protein and Low Protein may still possess considerable genetic variability; no apparent change was obtained in the mean oil content of Low Oil. All the strains show considerable modifications in morphology and yield as a result of the prolonged selection. Compared with adapted hybrids their yield has been reduced by approximately 50%. High Oil and High Protein have been used to transfer high oil and high protein content to inbred lines. In spite of its reduced grain yield High Oil produced a higher oil yield per acre than commercial hybrids or the best three-way

crosses involving one line with high oil content. High Protein, however, gave lower yields of protein than standard hybrids and three-way crosses for high protein content.

1885. Ghisleni, P. L.
La vitalità del polline di mais prolungata con i raggi ultravioletti. (The vitality of maize pollen prolonged by ultraviolet rays).
Ital. Agric. 1952 : **89** : 45–48.

The writer has shown by experiment that the vitality of pollen of *Zea Mays* L. can be prolonged by ultraviolet treatment.

1886. Koester, M. L.
The effect of continuous gamma radiation upon starch formation in *Zea mays* pollen.
Genetics 1951 : **36** : p. 559. (Abst.).

Pollen from plants exposed to more than 2·6 r. per day throughout the growing season showed an increase in the percentage of grains incompletely filled with starch; at 222·2 r. per day, 57% of the pollen was abnormal in this respect. The log of the radiation dosage plotted against the percentage of abnormal pollen produced a sigmoid curve.

1887. Burdick, A. B.
Dominance as function of within organism environment in kernel-row number in maize (*Zea mays* L.).
Genetics 1951 : **36** : 652–66.

The F_1 hybrids between an 8–rowed and a 4–rowed inbred exhibited dominance of the 8–rowed condition in ears at the top of the plant and dominance of the 4–rowed condition in ears at the lowest position. Between these two extreme positions the row number increased linearly with successive nodes up the plant. The inbred parents showed a comparable though much less marked trend. Thus the relative dominance of an allele follows a gradient within the plant, and gene action at successive stages of development depends upon the condition of the substrate. Flexibility in phenotypic expression of row number is greater in the F_1 heterozygote than in the more homozygous inbreds. Row number in the cross between an 8–rowed and a 4–rowed inbred appeared to be conditioned by a small number of genes; data from greenhouse material suggested that two complementary genes were operative; observations from field plants did not however agree with this result. Evidence concerning the relationships of the genes for row number with the *P*, *Y* and *Su* linkage groups was inconclusive.

1888. Burdick, A. B.
Evidence concerning the structure of an ear of corn (*Zea Mays* L.).
Amer. Nat. 1951 : **85** : 353–56.

The characteristics of two abnormal ears of maize are interpreted as giving support to the fusion hypothesis of the origin of the ear. It is suggested that condensation occurred first in a two-ranked spike and was followed by further elaboration at each node. The phylogenetic inferences of the evidence from the two ears examined are briefly discussed.

1889. Sager, R.
On the mutability of the waxy locus in maize.
Genetics 1951 : **36** : 510–40.

Detailed analyses of the mutability and action of genes at the waxy locus have been undertaken using a strain with an endosperm consisting of a mixture of cells containing waxy or nonwaxy starch. The mosaic phenomenon was found to result from the presence of wx^m, an allele with a high degree of mutability, at the waxy locus; mosaic kernels presumably arise by mutation from Wx to wx^m during endosperm development. Stable nonwaxy plants found among the progeny of $wx^m wx^m$ parents result from mutation during gamete formation; gametes carrying a dominant nonwaxy allele, Wx^1, have been recovered. The phenotypes of 40 back mutants carrying the Wx^1 allele proved indistinguishable, when homozygous, from kernels bearing the original dominant Wx.

Results of cytological investigations and linkage studies show that the instability of the wx allele cannot be ascribed to chromosomal aberrations, meiotic crossing-over or the influence of any other gene.

The expression of different pattern types depends on the time and frequency of mutations; inheritance of certain mosaic types as definite strains shows that the mutation rate is genetically controlled.

Differences between the ratio of amylose and amylopectin molecules are discussed with respect to the influence of a hypothetical inhibitor which prevents glucose polymers from becoming branched; the inhibitor is considered to be a direct or indirect product of the action of the waxy gene. It is suggested that the nature of the biochemical reaction dependent on the action of the waxy gene may mask a large number of genetic mutations; the apparent absence of intermediate alleles may be thus theoretically explained.

1890. **New hybrid corn has good milling quality.**
Crops and Soils 1952 : **4** : No. 5 : 26–27.
An unnamed hybrid white maize bred specially for the dry milling industry has been released in Texas and Oklahoma.

1891. Martin, J. H. and Jenkins, M. T.
New uses for waxy-cereal starches.
Crops in peace and war. Yearb. US Dep. Agric. 1950–51 : 159–62.
Uses of waxy maize and waxy sorghum in the USA and breeding work underlying these industrial developments are surveyed. The possible value of the waxy form of rice and other cereals is briefly discussed.

1892. Kozubenko, V. E.
(**Bukovinskaja 1 hybrid maize**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 6 : 65–66. [Russian].
Bukovinskaja 1 [Bukovina 1] was developed by fertilization of the early maturing variety Voronežkaja 67 [Voronež 67] with pollen from Zubovidnaja 3135 [Dent 3135], a drought resistant variety giving high yields of good quality grain. The hybrid outyields standard varieties and shows a reduction of 2–10 days in the period between germination and maturity.

1893. Giorgini, G.
Il granturco "giallo precoce del Valdarno." (**The maize, Valdarno Yellow Early**).
Agricoltura Tosc. 1951 : **6** : 439–40.
Having established by comparative trials that the local maize population in Arezzo was well adapted to its environment by its earliness and resistance to drought, the author sought out some suitable plants for selection. Valdarno Yellow Early, here described, is the result of this work. It is thought that by sowing in June with appropriate cultivation methods the crop might be ripe 10–12 days earlier than the usual harvest time for the district.

1894. Riley, E. A.
Hybrid maize disease resistance tests.
Progress Report, 1950/51.
Rhod. Agric. J. 1951 : **48** : p. 428.
Fusarium moniliforme was found to be only a mild pathogen whereas *F. moniliforme* var. *subglutinans* and *F. graminearum* were highly virulent in artificial inoculation tests of double hybrids and their parental single crosses and inbreds. Strains varied widely in reaction to *Fusarium* spp.; some exhibited marked resistance. No strain showed resistance to *Diplodia Zeae*. Strains with least susceptibility to disease are generally the best in yield, stalk strength and other characters.

1895. **U.S. 505, new hybrid corn, shows promise in Virginia tests.**
Crops and Soils 1951 : **4** : No. 3 : p. 26.
Results of trials indicate that a new yellow hybrid maize, US 505, is suitable for the Piedmont area and western Virginia where it matures at the same time as Ill. 200. The new hybrid outyields the latter in both regions and outyields US 13 in the Piedmont area; it has proved more resistant to *Helminthosporium turcicum* than US 13.

1896. Bliss, M. E.
Hybrids resistant to corn leaf blight can be developed.
Crops and Soils 1952 : **4** : No. 4 : p. 25.
Genetical evidence that resistance to *Helminthosporium* leaf blight can be incorporated into inbred maize was presented at meetings of the American Society of Agronomy, State College, Pa.

1897. **Key to corn leaf blight found.**
Ext. Serv. Rev. US Dep. Agric. 1951 : **22** : p. 174.
Inbred lines of maize with resistance to leaf blight have been developed at Beltsville, Md.; further breeding is in progress to combine resistance with other commercially desirable qualities.

1898. Beard, R. L.
The susceptibility of maize to the corn leaf aphid.
J. Econ. Ent. 1951 : **44** : 1024–25.
At the Connecticut Agricultural Experiment Station, relative susceptibility of several maize inbreds to damage by *Aphis maidis* was determined. A strain of C 31 with an indeterminate growth habit (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1955), controlled by a recessive factor designated *id*, proved extremely susceptible. A normally resistant inbred, Oh. 26, showed growth retardation comparable with C 31 *id* after treatment with maleic hydrazide, and was equally damaged by aphids. This suggests that susceptibility is greatest at a particular growth phase. However, further trials showed that when C 31 and C 31 *id* were at comparable growth stages in a mixed plot, aphid infection was a reliable index of plants carrying the *id* gene.

1899. Rosbaco, U. F.
Consideraciones sobre maíces "amargos" con especial referencia a su cultivo en la provincia de Entre Ríos. **(Considerations on bitter maizes with special reference to their cultivation in the Entre Ríos province).**
Inform. Invest. Agríc. (IDIA), B. Aires 1951 : **4** : No. 46 : 1–13.

A chronological survey is given of the information published on the Argentine bitter maizes, resistant to locust attack, since they were first described in 1906. Selfed seedlings of some of the bitter maizes contained certain individuals with strongly tripsacoid characters, and suggest that the bitter forms may have resulted from introgression with *Tripsacum*. In crosses between bitter and ordinary maize varieties the bitter character has been shown to be influenced by modifiers as well as the basic recessive gene *ag*, and to be linked to genes determining grain type, since no bitter dent forms have appeared. Synthetic hybrids have been made with the object of combining the maximum number of resistance genes.
Indications are given of the best methods of cultivation of bitter maize. It is more primitive in type than the common varieties but more drought resistant. Descriptions are given of a number of local types or varieties of bitter maize grown in the Argentine province of Entre Ríos.

1900. Gorter, G. J. M. A.
Streak disease in maize. Helpful measures for its prevention.
Fmg. S. Afr. 1951 : **26** : 361–62, 364.

In field trials carried out during the past 5 years by the Potchefstroom College of Agriculture (S. Africa), crosses of commercial varieties with P x H have shown promising yielding capacity and resistance to virus streak; P x H is a selection from a cross between the yellow flint Peruvian and the white dent Hickory King. The hybrids are being subjected to further tests.

1901. Rodgers, E. G.
Brittleness and other responses of corn to 2, 4-dichlorophenoxyacetic acid.
Plant Physiol. 1952 : **27** : 153–72.

During experiments carried out at Gainesville, Fla., the maize inbred W 22 and the single cross W 22 x M 14 proved considerably more susceptible to treatment with 2,4-D at eight different growth stages than WF 9 and WF 9 x Os. 420; both inbreds were more susceptible than the single cross in which each was involved.

1902. Rodgers, E. G.
Responses of corn to 2, 4-dichlorophenoxyacetic acid.
Iowa St. Coll. J. Sci. 1952 : **26** : 273–74. (Abst.).

Data from treatments at 8 different growth stages indicate that the maize inbred W 22 and single cross W 22 x M 14 were more susceptible to the herbicide 2,4-D than WF 9 or WF 9 x Os. 420. The inbreds sustained greater injury than the single crosses in which they were involved (cf. Abst. 1901).

1903. Caputa, J. and Geier, P.
Considérations sur la culture du maïs grains en Suisse romande. **(Considerations on the growing of maize for grain in French Switzerland).**
Rev. Romande Agric. Viticult. Arboricult. 1952 : **8** : 9–13.

Various aspects of the testing of hybrid maize in Switzerland are discussed with comments on the results of the trials that are being carried out on American hybrids, with the Swiss maize Vallée-du-Rhin as the control. The hybrid Funk G5 gave a record yield for its class of 95 q. per ha.
Seed production of late and early ripening hybrids has already been organized at Tessin and St. Gall respectively. Semilate varieties, taking 85–90 days to ripen, might also be suitable for Switzerland.

1904. Findley, W. R. (Jun.).
Report of the Sixth Northeastern Corn Improvement Conference, New Brunswick, New Jersey, February 5-6, 1951.
Div. Cereal Crops Dis., Bur. Pl. Indust. Soils Agric. Engin., Pl. Indust. Sta. Beltsville, Md. 1951 : Pp. 27. (Mimeographed).

The committee reports presented dealt with the Uniform Tests on double crosses, single crosses and inbreds of maize and with observations on sweet corn hybrids. Maize research problems discussed included: testing and breeding for cold resistance; resistance to disease, chiefly with reference to stalk rot resistance and possible correlations between resistance to this disease and other characters such as high sugar content of the stalk; and use of male sterility in hybrid production. D. F. Jones reported that semisterile hybrids are giving promising results. Breeding and other work on maize and sweet corn in New Jersey and six other states is summarized.

1905. **Corn hybrids and varieties in Mississippi, 1950 tests.**
Bull. Miss. Agric. Exp. Sta. 1951 : No. 478 : Pp. 19.

A detailed report is given of trials of maize hybrids and varieties at several centres. Hybrids recommended for the different regions of Mississippi are listed.

1906. Pass, H. and Brooks, J. S.
Performance tests of corn varieties and hybrids 1951.
Misc. Publ. Okla. Agric. Exp. Sta. 1951 : No. 24 : Pp. 28.

A detailed report is given of the results of tests on maize hybrids and varieties in Oklahoma.

BARLEY

1907. Hörberg, Y.
Weibulls Original Rikakorn. Ny kornförädling från Weibullsholm. (**The Weibull barley Rika. A new barley from Weibullsholm**).
Weibulls Ill. Årsb. 1951 : **46** : 11–14.

In spring 1951, Rika (W : s 4994), a sister variety of Herta derived from the cross Kenia x Isaria, was put on the Swedish market. In appearance it resembles Herta, but seems to have even stronger straw and is thus rather more suitable than Herta for combine harvesting. In some districts Rika has surpassed Herta in yield by about 3·1%. In grain quality the two varieties are equal and in malting quality Rika can probably be placed in the same class as Herta.

1908. Hörberg, Y.
Weibulls Stallar II. Ny foderkornsort för speciella områden. (**The Weibull variety Stallar II. A new variety of fodder barley for special areas**).
Weibulls Ill. Årsb. 1952 : **47** : 14–15.

Stallar II, a variety with a long stiff straw, formerly known as W : s 5006, bred from the cross Kenia x Isaria, was put on the market in 1952. It has already proved popular with farmers requiring a good yield of grain in combination with a satisfactory yield of straw. It ripens somewhat later than Stallar, an advantage when grown with oats in woodland districts, where it has been found that other barleys ripen too early. Like its sister varieties Herta and Rika, it shows no tendency to breaking of the ear or straw. The grain is large and plump with a thin pericarp and a higher hectolitre weight than Kenia, which it has also surpassed in grain yield by an average of 4%.

1909. Bandlow, G.
Mutationsversuche an Kulturpflanzen. II. Züchterisch wertvolle Mutanten bei Sommer- und Wintergersten. (**Mutation experiments on crop plants. II. Spring and winter barley mutants of value for breeding purposes**).
Züchter 1951 : **21** : 357–63.

The following mutants have been obtained by X-irradiation: from Haisa spring barley, 1 smooth awned and 15 almost smooth awned forms and 1 naked form; from Donaria, 1 almost smooth awned plant; and from the winter barley Friedrichswerter Berg, 8 plants resistant to the mildew races A and D. This is said to be the first record of such resistance in winter barley (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 976).

1910. Taylor, L. H.
Effects of natural selection in segregating generations upon bulk populations of barley.
Iowa St. Coll. J. Sci. 1952 : **26** : 301–02. (Abst.).

Each of 4 locations at which bulk populations of 20 barley crosses were grown for 3 generations had a marked effect on natural selection for yield and date of maturity. In respect of the latter characteristic, natural selection shifted the bulk populations towards early maturity in central and southern Iowa, whereas the date of maturity became later under conditions in northern districts. In all regions yields subjected to natural selection were compared with yields of artificial selections made from the 20 crosses.

The differential effect of location appeared to have little influence on natural selection for plant height or disease resistance.

Under natural conditions awned types increased in proportion to types with hooded ears and six-rowed forms increased at the expense of two-rowed types, suggesting that natural selection may rapidly change the composition of a bulk population.

1911. *Kuperman, F. M.
(**The morphophysiological method of study in the service of plant breeding**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 9 : 3–14. [Russian].

The relative adaptability of 40 botanical varieties of barley, from widely different

* An extended summary of this paper is on file at the Bureau.

environments, to conditions in the Moscow province is discussed. Those which survived showed a tendency to simulate the morphological characteristics of the 2-rowed local barleys belonging to the variety *nutans*. Such observations suggest that the characteristics of a botanical variety are determined by environmental conditions affecting the development of the primordia.

1912. Hagberg, A. and Tjio, J. H.
Cytological studies on some homozygous translocations in barley.
An. Estac. Exp. Aula Dei 1952 : **2** : 215–23.

An examination of 5 homozygous translocation stocks of the barley variety Mars obtained from C. R. Burnham has shown that chromosome b of Burnham corresponds to chromosome III of the authors, d corresponds to VII, and g to VI.

1913. Hanson, W. D.
An interpretation of the observed amount of recombination in interchange heterozygotes of barley.
Genetics 1952 : **37** : 90–100.

The linkage groups involved in three interchange stocks, 300, 301 and 302, proved to be I and IV, IV and VI, and II and IV respectively. Data are provided on linkage intensities between the interchange breaks and the appropriate genetic markers. The factor pair Lg_3lg_3 for green *vs.* lethal light green seedling has been found to be located in linkage group IV between *K* and *bl*. The interpretation of linkage measurements for group IV is discussed. It was assumed that a high proportion of the crossover chromatids arising within an interstitial region were associated with abortive spores; thus the observed recombination in an interchange heterozygote is appreciably lower than expected recombination. Analysis of the data entailed an interpretation of the interrelationship between the condition of reduced recombination and the amount of sterility exhibited by the interchange heterozygote; the information thus secured was used to postulate gene position in relation to the interchange breaks and centromere.

1914. Ono, T.
(**Some properties of polyploid barley**).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 41–42. [Japanese].

In a comparison between diploid and tetraploid strains of a series of Japanese barley varieties, the tetraploids tended to have shorter culms, longer ears and heavier grains than the diploids; the tetraploids were also less fertile but came into ear earlier.

1915. Dommergues, P.
Action de la colchicine sur l'orge cultivée. (**The action of colchicine on cultivated barley**).
Ann. Inst. Nat. Rech. Agron. 1951 : **1** : Sér. B : 295–331.

From a morphological, anatomical and caryological study of a line of the barley Aurore [Dawn] treated with increasing concentrations of colchicine during increasing periods of time, a satisfactory method was devised for obtaining and selecting tetraploids. The morphological, anatomical and biological features of the tetraploids are discussed.

1916. Clavier, Y. and Cauderon, A.
Un cas d'haploïdie chez l'orge cultivée. (**A case of haploidy in cultivated barley**).
Ann. Inst. Nat. Rech. Agron. 1951 : **1** : Ser. B : 332–35.

Details are given of the origin, morphology and cytological irregularities of a haploid derived from a plant of the six-rowed barley Prefect.

1917. Caldecott, R. S. and Smith, L.
The influence of heat treatments on the injury and cytogenetic effects of X-rays on barley.
Genetics 1951 : **36** : p. 546.

The influence of X irradiation (15,000 r.), heat treatment (75°–85° C) and combinations of both on dormant seeds of Himalaya barley was measured in respect of reduction in height of seedlings 14 days after germination, percentage survival to maturity, frequency of chromosomal aberrations in root tip cells and pollen mother cells, and mutation frequency in the next generation. Heat treatment alone had little effect on the seeds, but, when applied before X irradiation, significantly reduced the degree of injury caused by X rays; injuries produced in some plants by heat treatment following X irradiation were greater and in others less than those resulting from irradiation alone. Chromosomal aberrations were reduced by 30–50% and mutation frequency increased from 30 to 50% when seeds were exposed to high temperatures either before or after X irradiation.

1918. Halverson, A. W., Grafius, J. E. and Moxon, A. L.
The protein composition of Feebar, Odessa, and Plains barley grown in South Dakota.
Cereal Chem. 1952 : **29** : 18–29.
Protein fractionation studies show that variations in total nitrogen content cause greater changes in the proportion of salt soluble and alcohol soluble fractions of Plains barley, a variety having a medium protein content, than in Feebar and Odessa which have relatively high protein content.

1919. Clémencet, C.
Sur une forme nouvelle d'orge à deux rangs. (**On a new form of two-rowed barley**).
C.R. Acad. Sci. Paris 1945 : **220** : 59–61.

Blaringhem, L.
Remarques du sujet de la note de M. Clémencet. (**Remarks on the subject of the note from M. Clémencet**).
Ibid. 1945 : **220** : 61–62.
A mutant denoted *Hordeum distichum* var. *torsum* is described, which arose in a stock of the variety Orge d'Or [Golden Barley]. The mutant is characterized by a compressed and contorted spike in which each upper glumella is replaced by two lateral members.

1920. Dax, P. J. and Stewart, P.
Canadian barley development. An example of barley improvement.
Wallerstein Laboratories Communications 1951 : **14** : 275–88.
Sections are included describing early work on variety testing and distribution of pure seed of the standard OAC 21, and the breeding of Montcalm (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 530).

1921. Helgason, S. B.
The breeding, testing and distribution of U.M. 43-1020, a new malting barley.
Canad. Grain J. 1952 : **7** : No. 7 : p. 6.
UM 43–1020 was developed at the University of Manitoba, Winnipeg, from crosses involving the barleys OAC 21, Trebi and Peatland. Seed is being increased for distribution as it is hoped that the variety will prove acceptable in the final malting tests.

1922. Sisler, W. W. and Banasik, O. J.
Quality selection in early generation barley hybrids.
Agron. J. 1951 : **43** : 616–17.
Data obtained at the North Dakota Agricultural Experiment Station concerning malting quality of four F_3 lines from Kindred x Titan are compared with similar data on F_5 plants derived from the same four F_3 selections. Tests made in early generations, when only small quantities of seed are available, give sufficiently accurate predictions of malting quality to be used as bases for selection. In the F_3 and F_5 populations studied, the percentage of plants with desirable malting quality increased from 27 to 75% respectively.

1923. Alvarez Peña, M.
La clasificación varietal de las cebadas cultivadas. (**The varietal classification of cultivated barleys**).
An. Estac. Exp. Aula Dei 1952 : **2** : 234–49.
A revision in Spanish is given of Mansfeld's key to the botanical varieties of *Hordeum vulgare* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1644).

1924. Sedlmayr, K.
Az idei sopronhorpácsi ősziárpakísérletek tanulságai. (**Conclusions of experiments with winter barley at Sopronhorpács during this year**).
Agrártudomány, Budapest 1950 : **2** : 586–93.
The variety Beta 40 yielded best. Hybrids between Beta varieties and other barleys were not sufficiently winter hardy.

1925. Cauderon, A.
Les orges fourragères. Choix des variétés. (**Fodder barleys. Choice of varieties**).
Bull. Techn. Inform. Ingén. Serv. Agric. 1951 : No. 65 : 643–47.
French, Swedish and other varieties are listed with notes on their characteristics and suitability for cultivation in various districts of France. Breeding has been directed towards the production of higher yielding types more resistant to lodging. The Swedish spring barley Rika and the winter variety Bordia receive special mention as combining these two features and as suitable to the better type of soils.

1926. Bruehl, G. W.
Observations on *Pythium* root rot of barley and wheat.
Phytopathology 1952 : **42** : p. 4. (Abst.).
Varieties of barley have been found to differ in their mature plant reactions to *P. arrhenomanes* in South Dakota. The differences depend upon hereditary constitution and relative maturity

class; very early varieties as a group are more susceptible than later barleys.

1927. Jensen, N. F.
Powdery mildew of barley. Studies of yield losses and the inheritance of disease resistance.
Mem. Cornell Univ. Agric. Exp. Sta. 1951 : No. 305 : Pp. 39.

Grain and straw losses due to *Erysiphe graminis* var. *Hordei* are compared among seven varieties grown in test plots at Cornell University Agricultural Experiment Station, NY. Goldfoil proved most resistant to the locally prevalent race 4, and was used in the crosses Goldfoil x Wisconsin 38 and Ohio 3144 x Goldfoil, from which data were obtained showing that susceptibility was determined by a single incompletely dominant factor. Breeding to incorporate improved mildew resistance in commercially desirable varieties is therefore practicable.
A new race of mildew to which Goldfoil is susceptible appeared during these experiments under greenhouse conditions.

1928. **Disease-resistant barley developed.**
Sth. Seedsman 1952 : **15** : No. 3 : p. 26.

Goliad barley, developed primarily for winter forage in southern Texas, also produces satisfactory grain yields. It has the erect growth habit of a spring barley and, when planted in autumn, grows more vigorously than other winter barleys, producing tall strong straw. Goliad combines resistance to common races of leaf rust, stem rust, powdery mildew and *Helminthosporium* leaf blotch.

1929. Russell, R. C. and Popp, W.
The embryo test as a method of forecasting loose-smut infection in barley.
Sci. Agric. 1951 : **31** : 559–65.

High correlation was obtained between the results of embryo tests and field plot tests of loose smut infection for each locality used. It is suggested that the embryo test should be of practical value to breeders, seed growers and officials responsible for seed certification, as a means of determining the amount of infection present in any variety or line, as soon as the grain is threshed.

1930. Hill, C. C., Cartwright, W. B. and Wiebe, G. A.
Barley varieties resistant to the Hessian fly.
Agron. J. 1952 : **44** : 4–5.

During the period 1945–50 the bulk of the world collection of barleys numbering over 5000 varieties, maintained by the US Department of Agriculture, was tested for resistance to Hessian fly. Parallel greenhouse tests were made at Beltsville, Md., and Lafayette, Ind., in order to subject the barley to geographically distinct populations of flies. Dinar, Nile, Burgarab, Abusir, Besert 13, Besert 14 and Delta showed a high degree of resistance at both centres; all seven originated from either Tunis or Egypt. Nearly all the 26 varieties showing moderate resistance at Beltsville but greater susceptibility at Lafayette also came from North Africa, particularly from Egypt.
This extreme geographical localization of resistant varieties suggests that resistance is of comparatively recent origin. None of the 14 varieties of wild *Hordeum spontaneum* similarly tested showed resistance.

MILLETS AND SORGHUMS

1931. Tarasov, S.
(Breeding millet for cultivation under irrigation).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 8 : 26–28. [Russian].

The promising new millets, Uraljskoe Beloe [White Ural], Uraljskoe 1419, Uraljskoe A 2622 and Viktoria A 3282, yielding appreciably more grain than the standard Saratovskoe 853 [Saratov 853], have been bred at the Ural State Breeding Station. Uralskoe A 2622 and Viktoria A 3282 have higher 1000 grain weights than the standard. Uraljskoe 1491 did well in the 1950 trials on irrigated land in Astrahanj province and was made a standard.

1932. Kozyrj, A. T.
(*Setaria* grown in the Dnepropetrovsk province).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 6 : 36–38. [Russian].

Grain yields of 47 *Setaria* introductions are compared with the average yield of the standard millet Veselopodoljanskoe 367 [Veselyĭ Podol 367] which averages 25·7 c. per ha. The Chinese varieties Sjao-baĭ-ču [Hsaiopaichu], Daĭ-baĭ-ču [Taipaichu], Lisoboĭ-Antohuan, Nju-to-gou [Nutokou] and Sjao-hun-ču 41 [Hsaiohungchu 41] gave yields ranging from 31·4 to 36·5 c. per ha.; two Russian varieties, Ukrainskaja 38 [Ukrainian 38] and Cjurupinskaja 22, yielded between 32·6 and 33·5 c. per ha.
Setaria produces better quality green fodder and hay than Sudan grass, but tends to be

drought susceptible and to provide only a single cutting.

1933. Swanson, A. F. and Laude, H. H.
Grain and forage sorghums for Kansas.
Bull. Kans. Agric. Exp. Sta. 1951 : No. 349 : Pp. 55.

Varieties of the sweet, grain, grass and broomcorn types of sorghum are described in detail and information is given on the origin of introductions of the different types and of varieties developed in Kansas. The results of varietal tests carried out for several years are summarized in tables. The adaptation of varieties grown in Kansas and factors constituting good quality are discussed. The bulletin concludes with a brief section on breeding.

1934. Coleman, O. H. and Belcher, B. A.
Some responses of sorgo to short photoperiods and variations in temperature.
Agron. J. 1952 : **44** : 35–39.

Amber, Waconia, Leoti, Collier, Honey and Hodo, varieties of *Sorghum vulgare* representing extremes of adaptation in respect of temperature and light requirements, were each planted on 5 dates at fortnightly intervals during the winter for 3 years at Canal Point, Fla. All varieties sown in November and subjected to short photoperiods (10·4–11·7 hours) and mild temperatures (75° F) up to 30 days after planting produced mature seed in time for spring sowing the following year at Meridian, Mass. If temperatures below the specific critical requirement of a variety are experienced within the first 30 days, short photoperiods fail to influence the date of anthesis. Varieties differed in respect of sensitivity to temperatures below 75° F; Collier matured later than the other four in Florida and proved most sensitive to cool conditions.

1935. Martin, J. H. and MacMasters, M. M.
Industrial uses for grain sorghum.
Crops in Peace and War. Yearb. US Dep. Agric. 1950–51 : 349–52.

Recent developments in the industrial use of the grain sorghums in the USA are described. Mention is made of new commercial white-seeded varieties of kafir and milo for combine harvesting, which are more suitable for processing than varieties with coloured seeds.

1936. Swanson, A. F.
Making pellets of forage sorghum.
Crops in Peace and War. Yearb. US Dep. Agric. 1950–51 : 353–56.

Dehydration of forage sorghums is discussed, with some reference to varietal suitability.

1937. Ponnaiya, B. W. X.
Studies in the genus *Sorghum*. I. Field observations on sorghum resistance to the insect pest *Atherigona indica* M.
J. Madras Univ. 1951 : **21** : Sect. B : 96–117.

Only 15 out of the 212 sorghum varieties tested showed some degree of resistance to attack by maggots of the fly *A. indica*, ranging from 10 to 83%. Amount of oviposition was not associated with differences in susceptibility. After the third leaf stage the attack lessened on the resistant varieties; in the susceptible varieties it was fairly severe until the sixth leaf stage. In both susceptible and resistant varieties the attack ceased at the eighth leaf stage. These differences were connected with differences in the ability of the maggots to cut the growing apex of the seedling.

1938. Weibel, D. E. and Painter, R. H.
European corn borer attacks Kansas and Nebraska sorghum.
Crops and Soils 1952 : **4** : No. 4 : p. 22.

Reports indicate that although damage to stalks and heads has been slight compared with damage in nearby maize plots, there is evidence that milo types and early maturing strains are more susceptible than tall strains of late maturity.

RICE

1939. Kirk, L. E. and Silow, R. A. (Editors).
Report of the Second Meeting of the International Rice Commission's Working Party on Rice Breeding convened by the Food and Agriculture Organization of the United Nations, Bogor, Indonesia 9-13 April, 1951.
FAO, UN, Rome 1951 : Develop. Pap. No. 14 : Pp. 82.

A summary of the proceedings of the conference (cf. Abst. 410) precedes more detailed sections in which the following papers are presented:—

Reports of delegates on progress in rice breeding in 1950.

Brief reviews are given of breeding work carried out in each of the member countries.

Burma. (*pp. 10–11*).
Methods of pure line selection and hybridization among indigenous strains and between indigenous types and introductions from America and Japan in use at experiment stations are described. Crosses between indigenous rices and the American varieties Honduras and Fortuna gave progenies showing less sterility than hybrids with Japanese introductions, but the milling quality of the latter is superior.

Ceylon. (*pp. 11–13*).
Hybridization to combine the strong straw, response to fertilizers and resistance to shedding characteristic of *japonica* rice, with the tolerance and adaptability to adverse conditions possessed by *indica* varieties is under way. A variable amount of sterility was noted in the F_1, being 79·0 and 26·5% respectively in progenies of Vellai Ilankalayan 28061 x Taichu 65 and Vellai Ilankalayan 28061 x Norin 25. These F_1 hybrids have been back-crossed to their ♀ parent in an attempt to eliminate sterility.
Resistance to shedding is partially dominant in crosses of Vellai Ilankalayan 28061 with the indigenous varieties Pachchaiperumal 2462/11 and Panduruwi, but shedding shows apparent heterosis when the same ♀ parent is pollinated by Japanese or Burmese strains. F_2 data from Pachchaiperumal 2462/11 x Vellai Ilankalayan 28061 give evidence of segregation, with a tendency towards nonshedding.

French Union. (*pp. 13–15*).
In addition to the process of salvaging material from 40 destroyed experiment stations in Indochina and resuming adaptability trials, many stations in different countries are carrying out trials of introductions which are unaffected by changes in photoperiod or which come from areas experiencing similar environmental conditions. Hybridization is being undertaken in Cambodia to develop types suitable for mechanized cultivation.

India. (*pp. 15–17*).
Several improved strains have been obtained by selection from variable populations which have remained relatively unexploited in Western Uttar Pradesh, northern Bihar, hill tracts of the Punjab, western areas of Orissa and the borders of Assam. Intensive hybridization between the *japonica* and *indica* rices is directed towards early maturity. Many varieties combining desirable characteristics and suited to local conditions were released for different districts during the past year.
Mutants have been induced by exposing flowers to benzene vapour and by treating germinating seeds with acenaphthene.

Indonesia. (*pp. 17–23*).
Details are given of some 30 new varieties released for upland and lowland cultivation during 1951. Although large areas are suitable for floating rice, the common floating varieties mature too late under local conditions; as hybrids between these types and indigenous rices appear to grow well in rising water, further crosses were effected in an attempt to obtain strains with shorter growing period and improved quality.

Netherlands (*Surinam*). (*pp. 23–24*).
A systematic programme for improvement of rice varieties by introduction, pure line selection and hybridization is under way.

Philippines. (*pp. 24–25*).
Numerous promising hybrid selections showing a high degree of uniformity are reported among upland and lowland strains. At Los Baños interspecific hybrids between the wild species *Oryza minuta* and the American variety Fortuna were intermediate between the parents in respect of maturity date, length of tillers and grain size; the absence of awns, characteristic of Fortuna, proved dominant. A mutant for leaf variegation, from the variety Macarato, gave 63 normal green offspring and only 1 yellowish white individual.
Extracts from some unnamed local poisonous plants are claimed to have effects similar to those of colchicine.

United Kingdom (*Malaya*). (*pp. 25–27*).
Selection has been resumed with 9 outstanding varieties known to possess considerable natural genetic variation; strains of Nachin and Serendah Kuning giving 30% yield increases in excess of mean yields of original varieties have been obtained.

United States of America. (*pp.* 27–28).
Objectives of current breeding work are outlined.

Viet-Nam. (*pp. 28–29*).
Promising hybrids have been obtained from Thailand introductions having large heavy grains crossed with local varieties which are better adapted to the area and resist lodging.

Report of the FAO rice hybridization project up to February 1951. (*pp. 30–32*).
Details are given concerning percentage seed set in crosses carried out at the Central Rice Research Institute, Cuttack, Orissa, between 15 types of *japonica* rice from Japan and 38 *indica* types from Burma, Ceylon, India, Indochina,

Indonesia, Malaya, the Philippines and Thailand. In certain cases reciprocal crosses were made. Synchronization in time of flowering was achieved by subjecting the *indica* varieties to 8 hour photoperiods for about a month and exposing the *japonica* types to continuous light treatment; successive periodical sowings were also made.

Cultural investigations in relation to rice breeding. (*pp. 33–37*).

Two articles by K. Ramiah and G. A. W. van de Goor respectively discuss the effects of cultural practices such as time of sowing and transplanting, choice of manure and time of application and degree of irrigation on growth rate, yield, hardiness and resistance of improved varieties. The need for determining the optimum requirements of new varieties before their release is emphasized.

Pests and diseases in relation to rice breeding.

Logothetis, C. Review of information on some insects affecting the rice crop in south-east Asia. (*pp. 38–53*).

Detailed descriptions of 8 common pests include data on their distribution, host range and the relative resistance of varieties.

Lee Ling. Review of information on certain diseases of rice. (*pp. 54–66*).

Detailed notes on diseases caused by *Helminthosporium Oryzae, Piricularia Oryzae, Sclerotium Rolfsii, Fusarium moniliforme, Xanthomonas oryzae* and various nematodes provide information regarding host range and distribution but emphasize the scarcity of reliable data on varietal reaction.

van der Vecht, J. Nematode investigations conducted in connection with the rice breeding program in Indonesia. (*pp. 66–67*).

The degree of damage caused by *Radopholus oryzae* (*Tylenchus oryzae*) differs among local varieties and is also influenced by the time of infestation, number of nematodes and certain environmental conditions and cultural practices.

Production and distribution of high quality seed of improved varieties.

Nilsson-Leissner, G. The organization of seed production and distribution schemes. (*pp. 68–78*).

Various methods of maintaining a high standard of purity in improved varieties recommended to growers are outlined with examples from different countries.

Ramiah, K. Proposals for promoting the production and wider use of improved seed in India. (*pp. 79–80*).

It is suggested that the methods for large scale production of improved rice varieties, developed in some states, should be extended to other regions.

The basic program for seed improvement. (*pp. 80–82*).

The Japanese system of production and distribution of improved cereal varieties is outlined with a view to the possibilities of adapting the organization to the requirements of other countries.

1940. Sunaga, S.
On the economic meaning of the crop breeding in the Japanese agriculture.
Rep. Inst. Agric. Res. Tohoku Univ. 1951 : Ser. D : **1-2** : 79–102.

The economic consequences of breeding improved crop varieties are discussed, with particular reference to rice breeding since the beginning of the present century.

1941. López Ramírez, G.
La industria arrocera en el Brasil y Perú. (**The rice industry in Brazil and Peru**).
Not. Agron. Palmira 1951 : **4** : 1–33.

A review is included of the rice breeding work in the state of Rio Grande do Sul (Brazil).

1942. **British Caribbean research 1950–51.**
Commonw. Surv. 1951 : No. 81 : 25–26.

Projects briefly mentioned include breeding in British Guiana to develop a variety of rice suitable for mechanical cultivation.

1943. Nagao, S.
Genic analysis and linkage relationship of characters in rice.
Advanc. Genet. 1951 : **4** : 181–212.

Data published on the inheritance of many characters, some of which are of economic significance, are surveyed, special attention being given to papers in Japanese. The review deals with the inheritance of various abnormal mutant characters and of the colour of the apiculus, leaf, leaf sheath, node, internode and seed coat. The author establishes four linkage groups, typified by the genes *gl, Pl, lng* and *Sp*. The groups *gl, Pl* and *lng* correspond to groups I, V and IV of Jodon's system, respectively. The gene symbols proposed by Kadam and Ramiah and later accepted by Jodon are criticized on the ground that they do not conform to general genetic usage. A table is

given listing the characters whose inheritance has been analysed, the symbols recommended by Kadam and Ramiah, and the nomenclature suggested by the author.

1944. Jagoe, R. B. and Larter, L. N. H.
Improvement of padi varieties in Malaya.
Malay. Agric. J. 1951 : **34** : 127–30.

Limited progress achieved in improving rice varieties by selection and hybridization includes the selection of a high yielding strain of Serendah Kuning suited to the Negri Sembilan region. Results of varietal trials are also reported.

1945. Chevalier, R., Denoy, I. and Benoist, M.
Rizière expérimentale du Merle, 1950. (**The experimental rice plantation at Le Merle, 1950**).
Progr. Agric. Vitic. 1951 : **68** : 65–70; 86–93.

In this report on the experimental rice plantation at Le Merle, France, where a collection of over 60 varieties and lines of rice from Italy, Bulgaria, Japan and other sources are under observation, tabulated information is given on earliness, yield, and tendency to shedding and lodging.

1946. Siregar, H.
De betekenis van colchicine voor de planten veredeling in het algemeen en in het bijzonder voor de rijst. (**The significance of colchicine for plant breeding in general and more especially for rice**).
Landbouw 1951 : **23** : 357–88.

This paper consists largely of a survey on polyploidy in plants; the morphology, physiology, fertility and value of polyploid forms; and the effects of colchicine treatment on rice. The author has investigated the best technique for obtaining tetraploids; out of 50 plants treated, 8 were sectorial chimeras, and one a putative tetraploid. It is ultimately hoped to use the colchicine method to render the semi-sterile hybrids between bulu and tjere types fertile.

1947. Nagai, T.
(**On varietal differences in the catalase activity of rice seeds**).
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 189–90. [Japanese].

Catalase activity at 10° C was higher in early varieties than in late, but the reverse held true at 30° C.

1948. Morinaga, T. and Kuriyama, H.
(**Linkage between the genes for lax inflorescence, spreading pales and pigmentation in rice**).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : p. 33. [Japanese].

Analysis of the F_2 progeny of a series of Japanese rice crosses has demonstrated a cross over value of 31% between genes *lax* (lax inflorescence) and *A* (inhibition of apiculus pigmentation), and of 20% between *pa* (spreading pales) and *C* (pigmented apiculus).

1949. Silva, M. V. e.
Uma nova forma cultivada de arroz. (**A new cultivated form of rice**).
Agron. Lusitana 1951 : **13** : 171–83.

The new variety Português [Portuguese] (EAN 6) is a selection from the cross Novara x Muga. It has a 100 spikelet weight of 3497 grm., yields 5662–7516 kg./ha., and matures in 167 days. It has the technological properties of a Carolina rice, a type that has not yet been grown commercially in Portugal.

1950. Saito, K.
(**Studies on the rice plant in the delta region of the Yangtsekiang. V. Diagnostic morphological differences between the seedlings of *hsien* and *keng* rices**).
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 51–56. [Japanese].

The first three leaves of the Chinese nonglutinous *hsien* rices and of Indian varieties tend to be longer than those of the Chinese nonglutinous *keng* rices and of Japanese varieties. In typical *hsien* rices, Japanese upland rices and Indian varieties, tillering commences at the second node of the main stem; in *keng* varieties, Japanese irrigated varieties and a few anomalous *hsien* forms, it commences at the third node.

1951. Enloe, J. A.
Rice grows up in America.
Crops and Soils 1951 : **4** : No. 3 : 12–13.

Varieties suited to combine harvesting are mentioned. An Indian rice with a high degree of salt water tolerance has been introduced for hybridization with commercial varieties to develop salt water tolerant strains.

1952. Matsuo, T. and Tsunoda, S.
(Differential response of rice varieties to the application of ammonium sulphate and to the density of the plants).
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2: 94–98. [Japanese].
Some rice varieties grown in Japan are graded according to their ability to respond to $(NH_4)_2SO_4$ and to maintain yields when grown thickly.

1953. Minabe, M.
(Analytical studies of drought damage in rice. I. Varietal differences in the overground parts).
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2: 65–70. [Japanese].
Information is provided on the frequency of physiological and morphological indications of drought damage, the incidence of insect attack, mainly *Sesamia inferens,* and the degree of disease infestation, mainly *Piricularia Oryzae,* in a series of Japanese rice varieties. There is some degree of correlation between the extent of damage due to each of these three factors. Early and mid-season varieties tended to suffer less in proportion from drought than late varieties. A negative correlation was noted between attack by *P. Oryzae* and degree of silicification of the epidermal cells of the spike pedicels.

1954. Sakamoto, M.
On the new method of inoculation on rice plants with the blast fungus, *Piricularia oryzae* Cav.
Rep. Inst. Agric. Res. Tohoku Univ. 1951 : Ser. D : **1-2** : 15–23.
An inoculation technique using the leaf sheath is described, by which varietal reaction to *P. Oryzae* can be determined after 2 days.

1955. Doi, Y., Sugaya, T., Koshimizu, Y. and Murakami, S.
(Studies on treating rice roots with ammonium salts. I. Growth of the roots and protoplasmic streaming).
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 194–97. [Japanese].
High concentrations of $(NH_4)_2SO_4$ inhibit root growth and retard protoplasmic streaming of the root hairs. The inhibitory effect was greater in the low yielding but blast resistant variety Kameji than in the high yielding but blast susceptible variety Shinriki.

1956. Seko, H. and Kato, I.
[Studies on the resistance of rice to *Chilo simplex.* I. The relation between the variety of rice and egg-laying in the first generation (preliminary report)].
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 201–03. [Japanese].
Varietal differences are reported in the frequency of egg-laying by the first generation of the rice stem borer. A positive correlation was noted between the number of egg batches and the quantity of nocturnal watery exudate from the leaves. It is thought that nitrogenous compounds in the exudate may attract the borer moths chemotactically.

1957. Seko, H. and Kato, I.
(Studies on the resistance of rice to *Chilo simplex.* II. The relation between the variety of rice and the boring of the first generation larvae).
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 204–06. [Japanese].
A tendency was noted for larvae of the first generation of the rice stem borer to bore more readily into the leaf sheaths of varieties with wider bands of interfascicular parenchyma.

1958. Seko, H. and Kato, I.
[Studies on the resistance of rice to *Chilo simplex.* III. The relation between the variety of rice and the occurrence of initial damage by the first generation (preliminary note)].
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2; 207–08. [Japanese].
Varietal differences were noted in the initial damage caused by egg batches of the rice stem borer inoculated on to rice plants. The degree of damage was influenced both by the extent to which the stem was covered by the leaf, and by the degree of resistance of the plant to larval boring.

1959. **Annual Report of the Department of Agriculture, Colony of North Borneo for 1949 (1950)** : Counc. Paper No. **9** : Pp. 14. (Mimeographed).
Varietal trials of rice are briefly mentioned.

1960. **Annual Report of the Department of Agriculture, Fiji, for the year 1950** (1951) : Counc. Paper No. 28 : Pp. 40.
Varietal trials of rice are briefly mentioned.

FORAGE GRASSES

1961. Caputa, J.
Sélection des plantes fourragères. **(Breeding forage plants).**
Rev. Romande Agric. Viticult. Arboricult. 1952 : **8** : No. 1 : 1–4.

The aims in breeding are quality, yield, disease resistance, high seed production, and adaptation to the region of cultivation and to the particular use to which the crop will be put, e.g. pasture or cutting. Selection and hybridization should be preceded by a study of ecotypes and followed by the organization of pure seed production.

1962. Larin, V. I.
(Studying forage plants promising for introduction into cultivation and for reclamation of eroded slopes).
Bot. Ž. (Bot. J.), Moskva 1951 : **37** : 591–96. [Russian].

Introduction into cultivation of wild species is regarded as a quicker method of developing new forage plants than breeding from existing cultivated varieties. The argument is supported by the following evidence. At the Marusino Breeding Station, wild forms of fescue proved 10 to 50% more productive than the standard 45–A. At the Moscow Bog Reclamation Station, a wild local fescue outyielded by 28% a cultivated variety originating from the Bekasovskaja Station. At the Turskaja Research Station, wild forms of *Dactylis glomerata* yielded 66 to 122% more hay than a cultivated local variety. Finally, a late form of timothy, reaching maturity simultaneously with red clover, was selected from wild material at the USSR Forage Institute.

A list of the most promising wild forage crops is given, with notes on their economic or breeding value.

1963. Stammeforsøg med almindelig Raigræs og Timothe 1946–1950. **(Strain trials with ryegrass and timothy 1946-1950)**
Tidsskr. Frøavl 1951 : **20** : 195–97.

The trials of Danish varieties were conducted at eight places on various types of soils in Denmark. The seven best out of 11 ryegrass strains were all late forms, namely Hunsballe II, EF Hunsballe II, Trifolium Victoria II, EF Trifolium II, Stensballe II, Øtofte II and Pajbjerg II. Out of six strains of timothy, the three best were Øtofte A II, Øtofte II and Pajbjerg II.

1964. Tutin, T. G.
Origin of *Poa annua* L.
Nature, Lond. 1952 : **169** : p. 160.

An F_1 hybrid between *P. annua* ($2n = 28$) and *P. infirma* ($2n = 14$) was intermediate in character and completely sterile. It had a chromosome number of $2n = 21$ and at meiosis invariably showed 7 bivalents and 7 univalents. The chromosome set of *P. infirma* must therefore be homologous with one of the sets of *P. annua*, indicating that *P. infirma* must have formed one of the ancestors of *P. annua*. Attempts are being made to complete the proof of Nannfeldt's hypothesis that *P. annua* is an allotetraploid derived from *P. infirma* and *P. supina*.

1965. Löve, A.
Preparatory studies for breeding Icelandic *Poa irrigata*.
Hereditas, Lund 1952 : **38** : 11–32.

In a survey of 700 strains of *P. irrigata* (*P. pratensis* ssp. *irrigata*) from Iceland, chromosome numbers were found to range from $2n = 82$ to 147, with $2n = 112$ and 119 the most frequent numbers. Only 20% of the plants were aneuploids. The frequency curve for the range of chromosome numbers involved showed distinct peaks at all the euploid numbers from 84 to 140. Higher chromosome numbers occurred in the southern parts of Iceland and at higher altitudes than in the northern areas and in the lowlands. Even in limited areas variation in chromosome number was considerable. The chief mode of reproduction is parthenogenesis but a low frequency of fertilization occurs in some strains. The data indicate however that all the embryo sacs are formed exclusively by apospory. In strains with $2n = 101$ or more chromosomes parthenogenesis of the aposporous embryo sacs appears to be obligate. Chromosome number was positively correlated with pollen diameter, stomata length, seed weight, green weight, leaf length and possibly also culm length. No correlation was detected between chromosome number and pollen fertility as shown by staining, seed setting or seed germination. Methods of breeding *P. irrigata* are outlined. It is considered that selection of types with high chromosome numbers would result in stable strains giving good yields of hay.

1966. **Bright future predicted for Merion bluegrass.**
Seed World 1951 : **69** : No. 9 : p. 33.

The recently discovered Merion bluegrass (cf. Abst. 434) has proved resistant to root rot and tolerant of heat, drought and shade in Oregon and Washington. It forms a close turf particularly suitable for golf courses and playing fields.

1967. Hanson, A. A., Myers, W. M. and Garber, R. J.
The general combining ability of orchardgrass selections and their I_4 progenies.
Agron. J. 1952 : **44** : 84–87.

Clones of cocksfoot and their I_4 derivatives were compared for general combining ability, using a polycross nursery. The general combining ability of most of the I_4 lines was not materially different from that of the parental clones. The results indicated however that in some families inbreeding had isolated lines superior or inferior to the parental selection as regards general combining ability. It is considered that the utilization of inbred lines to produce synthetic strains would result in greater uniformity and productivity, provided the specific combining ability was adequately tested.

1968. Weiss, M. G., Taylor, L. H. and Johnson, I. J.
Correlations of breeding behavior with clonal performance of orchardgrass plants.
Agron. J. 1951 : **43** : 594–602.

Correlations observed between the performances of (*a*) selected clones of *Dactylis glomerata* and their open-pollinated progenies, (*b*) single-cross progenies and their parental clones, (*c*) single-cross progenies and open-pollinated progenies of the same parental clones and (*d*) clones and progenies grown in successive seasons at Ames, Ia., are discussed with reference to evaluation and selection of desirable plants. Significant positive correlations, sufficiently high to be used for predicting the value of clones for developing synthetic varieties, were found in respect of winter survival and panicle number in (*a*), (*b*) and (*c*); additional correlations occurred with respect to leaf width in (*a*) and in respect of leafiness and resistance to lodging and leaf diseases in (*b*). Clones performed more consistently over several years than did seedling progenies. Susceptibility to winter injury was common among clones with a tendency towards meiotic irregularities; the latter were measured by the number of micronuclei at the quartet stage of microsporogenesis.

1969. Holt, E. C. and Payne, K. T.
Variation in spreading rate and growth characteristics of creeping bentgrass seedlings.
Agron. J. 1952 : **44** : 88–90.

The open-pollinated progeny of 49 strains of *Agrostis palustris* was studied with regard to total growth, texture, density, type of growth and tolerance of drought. Interstrain differences for all these characters were recorded. The strains also differed in the amount of intrastrain variability. The high correlations found between most of the characteristics studied should facilitate the improvement of the species for use as turf.

1970. Jones, K.
Autotetraploidy in *Agrostis canina*.
Nature, Lond. 1952 : **169** : 159–60.

Data on meiosis suggest that *A. canina* var. *arida* ($2n = 28$) is an autotetraploid. Var. *fasciculatis* ($2n = 14$) behaves meiotically as a typical diploid. Observations on meiosis in the F_1 hybrid ($2n = 21$) between the two varieties indicate that the three genomes are highly homologous. The view is expressed that probably var. *arida* is the autotetraploid form of var. *fasciculatis*.

1971. Sinskaja, E. N.
(Promising forage plants and methods of using them).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 8 : 29–33. [Russian].

Several practical suggestions for more extensive use of wild material in breeding various forage plants are put forward.

Cereals for forage. Wild *Hordeum spontaneum*, in which the brittle ear may be eliminated by breeding and selection, and several ryes, including a land variety from the Altaĭ territory, an alternative rye Orahoĭskaja and several wild perennial rye forms found in the Caucasus, are regarded as promising.

Grasses. Some ecotypes of *Bromus erectus* are referred to as having economic possibilities. Selection of *Lasiagrostis bromoides* for vigour and tender leaf and tests of *Digraphis* species as perennial spring forage plants are advocated.

Legumes. *Medicago glutinosa* subsp. *polychroa*, found in Georgia, is regarded as useful material for breeding lucerne for earliness and resistance to diseases, and *M. coerulea*, and several species related to it, as useful material for breeding for resistance to drought. An improved hybridization technique by which fertile hybrids from crosses between lucernes with 16 and those with 32 chromosomes can be obtained is referred to. The method involves fertilization of non-emasculated flowers with mixed pollen containing self pollen or pollen of related species and forms.

It is expected that, in breeding work with red clover, heterotic hybrids may be produced by hybridization involving highly fertile Armenian

alpine strains and northern Pečorskiĭ [Pečora] strains.
Trials of vetches, *Vicia variabilis* at Erevan and *V. amoena* at Stavropolj, are mentioned.
More extensive use of wild species of sainfoin, which cross readily with the cultivated varieties and with each other, is urged. Mention is made of Meshetskiĭ sainfoin, a wild species resistant to drought and scorching by the sun, which has been selected in Georgia. Tests of the Armenian species should include *Lathyrus miniatus*.
Root crops for forage. Trials as green fodder plants of wild *Daucus* species, remarkable for their moderate soil requirements and resistance to drought, and of wild *Pastinaca* and wild Algerian and Caucasian *Beta* species, which are tolerant of soil salinity, are advocated.

1972. MEREDITH, D. and HURCOMBE, R. E.
Growth rate studies. Experiments with *Cynodon dactylon* and other species at the South African Turf Research Station 1948 : 48–51.
Considerable variation in growth rate was observed among species and varieties of *Cynodon* at the South African Turf Research Station. Fine-leaved varieties, including Florida (*C. transvaalensis*) and Bradley (*C. Bradleyi*), grew very vigorously, covering bare ground more rapidly than coarser types of *C. Dactylon*; turf formed by the latter was, however, extremely dense.

1973. **New strains of bromegrass give heavy yields of forage.**
Crops and Soils 1952 : **4** : No. 6 : p. 29.
Two bromegrass strains, Lyon and Lancaster, have been released by the University of Nebraska. Both produce abundant forage and seed in Nebraska. Lancaster is particularly fine-stemmed and the seed quality of Lyon is outstanding.

1974. WARNER, G. C. and HENSEL, R. L.
Texas Rescue 46 is an improved rescue grass strain.
Seed World 1951 : **69** : No. 8 : 8–9.
Texas Rescue 46, a strain of rescue grass developed by the Texas Agricultural Experiment Station, has shown several advantages over native and introduced strains. It has a desirable upright habit and is highly resistant to disease. It produces its forage crop comparatively late in the spring. Seed production is also correspondingly later, an advantage where early spring rains are frequent and heavy. The new strain shatters less than others.

1975. WALTERS, M. S.
Spontaneous chromosome breakage and atypical chromosome movement in meiosis of the hybrid *Bromus marginatus* x *B. pseudolaevipes*.
Genetics 1952 : **37** : 8–25.
B. pseudolaevipes ($2n = 14$) has regular meiosis. *B. marginatus* ($2n = 56$), however, occasionally shows meiotic irregularities which have also been observed in the hybrid between these two species ($2n = 35$). They comprise attached fragments, stickiness and chromosome erosion. On the average 7 bivalents and 21 univalents per cell occur at metaphase in the hybrid; spontaneous breakage however appears to be confined to paired chromosomes and to the chiasma-forming arms of these chromosomes. It is suggested that attached fragments may be produced by cross-over breaks in paired chromatids at early prophase which do not reunite to form cross-over chromatids. Restitution of one or more chromatids may occur. Centromere breakage is regarded as occurring independently of the other chromosome breakage. Noncentromeric chromosome movement has been observed, chiefly in some lagging univalents which divided prematurely at anaphase I.

1976. MCDONALD, E. D., KALTON, R. R. and WEISS, M. G.
Interrelationships and relative variability among S_1 and open-pollination progenies of selected bromegrass clones.
Agron. J. 1952 : **44** : 20–25.
The extent of association between parent and progeny and interprogeny relationships in respect of agronomic characters, including plant height, diameter of crown, number and size of panicles, hay yield and general vegetative vigour both in autumn and spring, have been investigated at Ames, Ia., using selfed and open-pollinated progenies of 40 selected clones. All characters were significantly correlated with yield in both selfed and open-pollinated progenies, the degree of association being high except for height. Variation in yield, spread and height was significant among families and between selfed and open-pollinated progenies; mean variance was greatest within the selfed offspring. Correlation coefficients between yield and other agronomic characters were greater between the parent clones and open-pollinated progenies than between the parent clones and selfed progenies, averaging +0·54 and +0·16

respectively, thus indicating the importance of using an open-pollinated progeny test to predict the potential yield of selections (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 379).

1977. Nielsen, E. L.
Cytology and breeding behaviour of twin plants of *Bromus inermis*.
Bot. Gaz. 1951 : **113** : 23–54.

Variations in morphology, pollen diameter and abortion, seed set following self and open pollination, seed weight and germinability, chromosome number and meiotic behaviour were analysed in 28 sets of twins. Considerable differences in seed set after both self and open pollination were recorded both between and within twin sets. Variations in frequency of irregular meiosis between and within sets were noted; the amount of irregularity tended to be inversely related to the seed set after self and open pollination. Twins with $2n = 28$, 56 or 70 occurred. Wide differences in response to inbreeding were found between and within twin sets; I_1 progenies from some plants showed no material reduction in vigour. Low self fertility in I_0 parents was not closely related with the occurrence of I_1 plants having superior vigour. No evidence of a monozygotic origin of the twins was obtained. On the assumption that they form a representative random sample, the plants from double seeds were also studied as regards morphology, breeding behaviour and cytology from the point of view of the species as a whole. Attention is drawn to the relatively high frequency of translocation configurations and of multivalents during meiosis, suggesting that the species is of allopolyploid origin.

1978. **Hardy new bromegrass gives high yields of hay, forage and seed.**
Crops and Soils 1951 : **4** : No. 3 : p. 27.

Homesteader, a winter hardy brome grass derived from five hardy varieties grown in South Dakota for over 40 years, has been released by the South Dakota Agricultural Experiment Station; it has outyielded Lincoln and Canadian Commercial in respect of forage and seed.

1979. Staten, R. D.
An evaluation of several varieties of side-oats grama in controlled and field environments.
Abstr. Doct. Diss. Neb. Univ. 1951 : 32–37.

Greenhouse experiments in which six varieties of *Bouteloua curtipendula* from different latitudes in the US were subjected to varying photoperiods to determine the conditions necessary for maximum inflorescence production are reported. North Dakota 97 and Nebraska 37, two varieties from northern regions, responded as long day plants; Nebraska 52 and El Reno, from the Central Plains, required a photoperiod of 12–13 hours for inflorescence production; and Oklahoma Tucson and New Mexico A–3603, from the southern regions, flowered readily in photoperiods of 11 hours. Reproductive development of both central and southern varieties was retarded by exposure to 16 hour photoperiods, whereas inflorescence production in northern varieties was favoured by this treatment.

Forage and seed yields of the same six varieties grown in field plots at the Nebraska Agricultural Experiment Station over 2 years were also compared. North Dakota 97 and Nebraska 37 matured 3 weeks earlier than other varieties, but seed yields of 100 and 360 pounds per acre were recorded for North Dakota 97 and El Reno respectively. Maximum forage yields were produced much earlier by northern varieties than by southern types.

A variable strain, N–1118, originating in south-eastern Nebraska and resembling the northern ecotypes in respect of growth form, showed a marked tendency towards the growth form of southern strains after four years' selection. The wide range of plant type shown by the F_1 from Nebraska 37 x Nebraska 52 indicates the possibility of selecting strains which combine desirable qualities formerly characteristic of varieties adapted to different latitudes.

1980. Grau, F. V.
This is Meyer (Z-52) Zoysia.
Seed World 1952 : **70** : No. 4 : 14, 16.

The advantages and disadvantages of the promising *Zoysia* turf grass strain Meyer, developed by the US Golf Association Green Section, are discussed.

1981. Ponnaiya, B. W. X. and Appathurai, R.
Forking of filaments in *Pennisetum typhoides* Stapf. and Hubbard.
Curr. Sci. 1951 : **20** : 331–32.

Forking of the stamen filaments has been observed in a plant from the bulk selection MS 5640 at the Koilpatti Agricultural Research Station, Madras. The character is probably due to mutation; its inheritance is under investigation.

1982. Polakowska, M.
Przegląd systematyczno-anatomiczny krajowych gatunków rodzaju *Calamagrostis* Adans. (**A systematic and anatomical review of the species of the genus *Calamagrostis* Adans. native to Poland**).
Ann. Univ. Mariae Curie-Skłodowska Lublin-Polonia 1951 : Sect. C : **6** : 1–18.

This paper reviews the species of *Calamagrostis* found in Poland, with special reference to anatomical structure. The hair on the ribs on the upper surface of the leaf is a phylogenetic character of diagnostic significance.

LEGUMINOUS FORAGE PLANTS

1983. Vogt, E.
Die Züchtung säureverträglicher und beweidungsfähiger Luzernesorten. (**The breeding of varieties of lucerne that are acid tolerant and suitable for pasture**).
Mitt. dtsch. LandwGes. 1952 : **67** : p. 170.

The breeding of acid tolerant lucerne, begun originally in 1923 at Schwiebus in Ostmark, Germany, has been successfully concluded.

1984. Grandfield, C. O.
Alfalfa in Kansas.
Bull Kans. Agric. Exp. Sta. 1951 : No. 346 : Pp. 65.

This bulletin reviews investigations on lucerne carried out by the Kansas Agricultural Experiment Station over a number of years. It includes sections on the following: old and new varieties; varietal resistance to diseases and cold; breeding, with particular reference to the development of synthetics and F_1 hybrids; and factors affecting seed production.

1985. Gelin, O. E. V.
Weibulls Alfa-lusern. (**The Weibull lucerne Alfa**).
Weibulls Ill. Årsb. 1951 : **46** : p. 25.

A new Danish strain of lucerne, obtained as the result of 11 years of breeding in Denmark to improve a selection from a number of French strains in that country, has been taken up by the Weibull Institute of Plant Breeding and given the name Alfa. It grows rapidly and gives a good aftergrowth, is probably more winter hardy than the French lucerne strains and is almost as hardy as Grimm, which it has also outyielded considerably in Örebro, Gotland, Skaraborg and at Weibullsholm.

1986. Karaščuk, I. M.
(**Breeding lucerne with fibrous roots**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. **7** : 47–53. [Russian].

The fibrous much-branched root systems found in certain ecological types of yellow lucerne are correlated with bushy habit and luxuriant foliage even under conditions of drought. The author recommends the crossing of wild yellow strains with cultivated blue lucerne, pointing out that in the hybrids, the fibrous root system of the wild maternal plants is always dominant.

1987. **Rhizoma, new alfalfa, developed in Canada.**
Crops and Soils 1952 : **4** : No. **4** : p. 27.

Rhizoma lucerne, developed at the University of British Columbia from a cross between the variety Don (*Medicago falcata*) and a selection from Grimm, inherits the spreading growth habit of Don. The new variety produces good yields of forage and seed, and has underground rhizomes which withstand low temperatures.

1988. Wheeler, W. A.
The beginning of hardy alfalfa in North America.
Seed World 1951 : **69** : No. **9** : **24**, 49–50.

Breeding work carried out in the US to develop winter-hardy strains of lucerne is reviewed. Particular reference is made to the winter hardiness of Grimm; modern breeding techniques have failed to produce superior strains to replace seed derived from stocks already under trial in 1901.

1989. **New alfalfa varieties show wilt resistance.**
Crops and Soils 1952 : **4** : No. **6** : p. 29.

Strains with increased resistance to bacterial wilt have been obtained at the Colorado Agricultural Experiment Station by selection from the lucerne varieties Meeker, Baltic and Hardistan. Seed setting ability has improved with greater wilt resistance.

1990. **New alfalfa resists dwarf virus disease.**
Crops and Soils 1951 : **4** : No. **3** : p. 26.

California Common 49, a lucerne with tolerance of dwarf virus disease, has been released by the California Agricultural Experiment Station to

replace the susceptible California Common in areas where the virus is prevalent.

1991. NIJDAM, F. E.
Two independent, recessive factors producing a pink flower colour in *Trifolium pratense*.
Genetica 1951 : **25** : 516–18.

The assumption that the recessive factor pair *bb* is responsible for the production of pink flowers failed to explain the occurrence of purple-flowered F_1 hybrids when a pink-flowered type, developed locally at Wageningen, was crossed with another pink-flowered specimen from northern France; pink flowers reappeared again in the F_2.
Some 20 crosses undertaken between plants of the F_2 and a pink-flowered individual of known origin gave progenies segregating in agreement with the amended hypothesis that there are 2 independently inherited epistatic recessive factors, *b* and b^1, which can each produce pink flowers. Thus the two original parents, bbB^1B^1 and BBb^1b^1, would give rise to pink-flowered individuals with the following genotypes: BBb^1b^1, Bbb^1b^1, bbB^1B^1, bbB^1b^1 and bbb^1b^1.

1992. JULÉN, G.
Svalöfs Silo rödklöver—en ny klövertyp.
(**The Svalöf red clover Silo, a new type of clover**).
Sverig. Utsädesfören. Tidskr. 1951 : **61** : 347–55.

Selection for early flowering in the medium late clover Merkur resulted in the production of the new red clover, Silo, which flowers only a few days after Essi and 10 days before Merkur; owing to the higher proportion of leaf to stem in the aftermath from Silo, the crude protein percentage is higher and the crude fibre percentage lower than in Essi.

1993. LYSIKOV, V. N.
(**Bringing into cultivation the wild red clovers of northern Kirgizia**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 7 : 29–35. [Russian].

Kirgiz wild red clover forms a complex population from among which the three following varieties have been isolated: (1) Grigorjevskiĭ, yielding most hay and seed in its second year and suitable for cultivation at the higher altitudes in Kirghizia; (2) Čuĭskiĭ clover, yielding two cuttings each year and maturing later than the third variety; and (3) Frunze 1, an early maturing variety which can be cut twice each year. The many types composing Frunze 1 may be divided into one group consisting of broad-leaved, pale green, late-maturing plants, and another comprising dark green, early-maturing plants bearing elongate leaves. Frunze 1, in general, consists of hardy plants which are tall, leafy, resistant to drought and capable of producing high yields.

1994. **Pennscott clover is promising for northeast.**
Seed World 1951 : **69** : No. 10 : 16, 46.

The medium red clover Pennscott has given good results in Pennsylvania (cf. Abst. 462). At four out of five testing grounds it has given the highest yield of dry matter per acre, even surpassing Kenland. It has maintained a stand in years when other varieties have died out.

1995. SUETSUGU, I. and MATSUMOTO, S.
(**The relation between fertilization in red clover and the type of visiting bee**).
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 31–34. [Japanese].

Seven species of bee have been observed as effecting pollination in the Hokuriku district of Japan. *Bombus* spp. were the most useful.

1996. EHARA, K.
[**Studies on the fertilization of red clover (*Trifolium pratense* L.) by bees. I. On the bees visiting red clover**].
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 157–60. [Japanese].

Bee species visiting red clover in Hokkaido (Japan) are listed; the most important were *Eucera sociabilis* and *Apis* spp.

1997. EHARA, K.
[**Studies on the fertilization of red clover (*Trifolium pratense* L.) by bees. II. Studies on the fertilization of red clover under artificial conditions**].
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : Nos. 1/2 : 161–64. [Japanese].

Various bee species were introduced into a series of cheese cloth cages over *T. pratense* plants to ascertain their effectiveness as pollinators. *Bombus wustneii chinganensis* and *Eucera sociabilis* proved the most effective.

1998. Ehara, K.
[Studies on the fertilization of red clover (*Trifolium pratense* L.) by bees. IV. Studies on the utilization of cut flowers as pollen plants].
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 168–70. [Japanese].

Bombus wustneii chinganensis has been successfully used in hybridization for transferring pollen from cut flowers of red clover to the mother plants.

1999. Sheul, R. W.
Some factors affecting nectar secretion in red clover.
Plant Physiol. 1952 : **27** : 95–110.

In an investigation of the relative influence of night temperature, solar radiation, atmospheric humidity and genotype on nectar secretion in red clover, analyses of mean nectar yield and concentration were made on three Kenland clones over a period of 5 weeks at Columbus, Ohio. The marked superiority of clone 23 over clones 4 and 10, with respect to volume of nectar, indicates the possibility of effecting selection for high nectar yield, thus increasing the likelihood of insect pollination and, subsequently, the percentage seed set.

2000. Willard, C. J., Thatcher, L. E. and Jeffers, R. L.
Kenland red clover. . . . New disease-resistant variety adapted to southern Ohio.
Ohio Fm. Home Res. 1951 : **36** : 84–85.

Kenland, a red clover highly resistant to southern anthracnose, shows promise for southern Ohio (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2741).

2001. Frandsen, K. J.
Studies on the clover stem nematode (*Tylenchus dipsaci* Kühn).
Acta Agric. Scand. 1951 : **1** : 203–70.

The reactions of red clover strains and families to nematode attack by artificial infection and under natural conditions in the field showed good agreement in experiments in Denmark. Populations of nematodes isolated from red and white clover and lucerne may be regarded as different races, which are however not sharply separated. Analysis of variation in resistance of red and white clover shows that scope for selection exists. It has been found that the progenies of crosses between comparatively susceptible forms of red clover and more resistant ones contain families which are as resistant as the most resistant parent. Intensive selection has already resulted in a level of resistance significantly above that of the most resistant strains so far available. Tetraploid red clovers have exhibited greater resistance than the corresponding diploids. The three strains of lucerne tested show no significant differences in nematode resistance.

2002. Živov, V. and Skvorcov, S.
(How to increase the pollination of seed clover by bees).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 6 : 63–64. [Russian].

Mention is made of progress in breeding strains of red clover to which bees are attracted, with special reference to Uralec 349 [Ural 349], Krasnoufimskiĭ 523 and 882 [Krasnoufimsk 523 and 882] which are all readily visited by bees and consequently give heavy seed yields in addition to good crops of hay.

2003. Stammeforsøg med rødkløver. 1945–1950. **(Strain trials with red clover, 1945-50).**
Tidsskr. Planteavl 1951 : **55** : 181–84.

During 1945–50 trials of nine early and ten medium-late strains of Danish red clovers were carried out on different types of soils in ten places in Denmark.
Yields of clover and of dry matter per ha. are tabulated, with notes on the grading allotted to the strains certified. With one exception the selections were from already well-known varieties.

2004. Stammeforsøg med Rødkløver 1945–1950. **(Strain trials with red clover 1945-1950).**
Tidsskr. Frøavl 1951 : **20** : 193–95.

Nine Danish strains of early and ten of medium early red clover were tested at ten different places on various soils, in Denmark. The five leading early strains, designated III and certified as first class, were Hinderupgaard III, Trifolium III, Taastrup III, Øtofte III and Resistant Øtofte III. The four best medium early strains were Dæno III, Trifolium III, Resistant Øtofte III and Øtofte III. Brief notes are given on origin and time of flowering.

2005. Gausman, H. W. and Fuelleman, R. F.
Distinguishing Ladino from white clover plants.
Agron. J. 1952 : **44** : 96–97.

Differences in the number of vascular bundles in the petiole provide a means of distinguishing Ladino from other types of white clover.

2006. Brewbaker, J. L.
Oppositional allelism in diploid and tetraploid alsike clover.
Genetics 1951 : **36** : p. 542. (Abst.).

Incompatibility reactions in Alsike clover provide data comparable with those obtained by studying white clover (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1921). Segregation of progenies resulting from crosses between self incompatible F_1 plants and from reciprocal back crosses with the self incompatible parents is explained by the regular oppositional allelic system in which parents differ in respect of both compatibility alleles.

Tetraploids were obtained by treating both parent and F_1 plants with colchicine. Segregation was observed in progenies resulting from: self pollination within a self compatible tetraploid derived from the parent genotype; cross pollination between the self compatible tetraploid and self incompatible tetraploids derived from parent and F_1 genotypes; and hybridization between self incompatible tetraploids. Results indicate the interaction of *S* alleles in the heterozygous pollen (S_1S_2) from the self compatible individual ($S_1S_1S_2S_2$).

2007. Lowery, J. C.
Manganese bur clover, reseeding variety, gives big seed yield.
Crops and Soils 1952 : **4** : No. 4 : p. 27.

The release of Manganese clover is reported from Alabama. It is a vigorous variety, producing heavy seed yields in a mixed stand with Johnson grass.

2008. Širjaev, G.
New species of Fabaceae.
Brittonia, New York 1951 : **7** : 275–77.

Descriptions of the new species *Onobrychis Ralphii*, *Astragalus punjabicus* and *A. albus*, and of the new variety *Ononis hircina* var. *indica* are given.

2009. **New game food plants are hardy enough for northern states.**
Crops and Soils 1952 : **4** : No. 6 : 27–28.

The US Department of Agriculture has developed a hardy strain of *Lespedeza bicolor*, named Natob, which can be grown as far north as the Canadian border.

2010. Bringhurst, R. S.
Genetic analysis of chlorophyll deficiency in *Melilotus alba* x *M. dentata* hybrids with some observations on meiotic irregularities.
Genetics 1951 : **36** : p. 543. (Abst.).

Chlorophyll deficient hybrids from *M. alba* x *M. dentata*, reared at the University of California by grafting on sweet clover rootstocks, have been back-crossed to *M. alba*. Progenies included chlorophyll deficient lethals and normal green individuals. Chlorophyll reduction proved to be cumulatively conditioned by three genes, designated ch_1, ch_2 and ch_3. The latter, when heterozygous in the presence of "normal" alleles of ch_1 and ch_2, conditioned significant reduction in chlorophyll; plants homozygous for "defective" alleles of both ch_1 and ch_2, homozygous for ch_3 alone or heterozygous for all three genes in combination, are seedling lethals. Chlorophyll deficiency also occurred among progeny of hybrids back-crossed to *M. dentata*.

The very low percentage survival of interspecific hybrids may be partly associated with cytological irregularities in the pollen mother cells.

2011. Smith, W. K.
Chlorophyll-deficient interspecific hybrids in *Melilotus*.
Genetics 1951 : **36** : 576–77. (Abst.).

Crosses effected at the University of Wisconsin between species of the subgenus *Eumelilotus* have revealed differences between hybrids in respect of chlorophyll accumulation. *M. alba*, *M. polonica* and *M. suaveolens* gave normal green hybrids when intercrossed, but the chlorophyll deficient progenies produced when *M. alba* was crossed with *M. dentata*, *M. taurica*, *M. altissima* and *M. wolgica* constituted an effective barrier against interspecific hybridization. Attempts to cross *M. officinalis* with all seven species were unsuccessful.

2012. Sandal, P. C.
Mechanisms of self- and cross-incompatibility in sweetclover, *Melilotus officinalis* Lam.
Iowa St. Coll. J. Sci. 1952 : **26** : 276–78. (Abst.).

An analysis of self and cross compatibility in Madrid sweet clover under greenhouse conditions confirmed a predominance of self incompatible individuals already noted by other workers. Segregation for self compatibility occurred in all S_1 and S_2 progenies; the data indicate that a highly significant correlation exists between the self compatibility of parents and their inbred progenies. Significant differences in respect of self compatibility were observed among the F_1 of crosses between relatively incompatible types or between plants showing a high degree of self compatibility. Intraprogeny crosses made in three groups of

S_1 progenies differing widely in average self compatibility suggested the operation of an oppositional type of incompatibility, particularly in individuals exhibiting a low degree of fertility. Deviations from this system are apparently due to various factors modifying the expression of self compatibility. It is suggested that one factor pair, S_xS_y, in conjunction with a self fertility factor pair, *Aa*, conditions compatibility in S_0 clones showing a low degree of fertility; *Aa* and another self fertility factor pair, *Bb*, combine with S_xS_y to determine the compatibility reactions of S_0 clones of high fertility.

2013. **Florida develops improved sweet clover.**
Sth. Seedsman 1952 : **15** : No. 3 : p. 43.
An improved strain of annual sweet clover, named Floranna, has been developed by the Florida Agricultural Experiment Station in cooperation with the US Department of Agriculture. As a winter legume adapted to a wide range of soils, Floranna makes 25–50% more growth than other commercial strains under adverse climatic conditions.

2014. Norris, M. J.
New insect pest attacks biennial sweetclovers in North-central Texas.
Crops and Soils 1952 : **4** : No. 4 : p. 27.
All locally grown biennial varieties are susceptible to the sweet clover root borer (*Walshia amorphellia*) which causes wilting and death at the end of the first year's growth. The annual variety Hubam has proved resistant.

2015. Boguslawski, E. v. and Vömel, A.
Untersuchungen über die Eignung von Neuzüchtungen für den Stoppelfruchtbau. (**Investigations on the suitability of newly bred varieties for use as catch crops**).
Züchter 1951 : **21** : 324–45.
Observations were made in 1948 on certain selections of mustard, swede, oil radish (*Raphanus oleiferus*), *Brassica juncea* and summer rape in regard to their suitability for use as fodder crops sown in the stubble of a cereal crop. In later years, selections of sunflower, *Panicum mileaceum*, *Setaria italica*, *B. nigra*, maize, sorghum, vetch and field peas were also tested. The highest yields of fodder were obtained from the oil radish and certain sunflower selections. Clear varietal differences were observed in the yielding capacity of strains of *B. juncea* and *B. nigra* and of the millet varieties. The variety Goldrispe of *P. mileaceum* gave particularly high yields of fodder in a minimum growing period. Strain P70/41 of *Lathyrus sativus* gave good yields of high quality fodder and the C strains were also promising.

2016. **New high-yield forage legume.**
Seed World 1951 : **68** : No. 11 : p. 92.
Granger, a broad-leaved strain of *Lotus corniculatus*, has been released for certain areas in Oregon after 14 years' testing. The original seed was obtained from England by the US Department of Agriculture. Two outstanding characteristics of Granger are its vigorous seedling development, reducing loss during establishment, and its rapid recovery after harvesting.

ROOTS AND TUBERS

2017. Nordén, F. and Hörberg, Y.
Varför odla rotfrukter? Weibulls Original Triumf fodersockerbeta. Nyhet 1951. (**Why grow root crops? The Weibull sugar mangel Triumf. A new production for 1951**).
Weibulls Ill. Årsb. 1951 : **46** : 17–20.
The variety Triumf [Triumph], bred at Weibullsholm, is a smooth large white mangel without lateral roots and easy to lift. The dry matter content is 17% and the top is less susceptible than older strains to yellows. In yield of dry matter it has exceeded Barres Semilong, Milka, Nova and Weibulls Slättbo Barres II strain 16 in various trials. It is recommended for feeding pigs and horses.

2018. **Results of fodder beet trials.**
Mon. Rep. Minist. Agric. N. Ire. 1952 : **26** : 323–25.
A discussion is given of the results of trials carried out in several districts in Northern Ireland during 1951 to compare the varieties Hunsballe X, Pajbjerg Rex X and Red Øtofte as regards total yield and yield of dry matter per acre.

2019. Castle, M. E., Foot, A. S. and Rowland, S. J.
Fodder beet. Comparison of Danish fodder-beet and English mangold in the south of England, 1947-9.
Emp. J. Exp. Agric. 1952 : **20** : 1–9.
The results of trials of the fodder beet varieties Øtofte and Pajbjerg Rex in comparision with the mangold Yellow Globe show that fodder beet offers certain advantages over mangold. Under identical conditions of season, cultivation and fertilizer treatment, the beets produced significantly larger yields of dry matter per acre, in a much more concentrated form.

2020. Young, K. E.
Fodder beet in Denmark.
J. Minist. Agric. 1952 : **58** : 521–24.
A brief summary of the results of recent trials of Rød Øtofte [Red Øtofte] and other varieties in Denmark is included.

2021. Tatebe, T.
(Studies on the behaviour of incompatible pollen in *Brassica*. III. *B. pekinensis*, the Osaka cabbage and *B. juncea*).
Engeigaku Kai Zasshi / J. Hort. Ass. Jap. 1950 : **19** : 221–24. [Japanese].
Self pollen and cross incompatible pollen of *B. pekinensis* germinates feebly, producing short tubes with a tendency to coil. Cross compatible pollen sends out strongly growing tubes. The behaviour of self and cross pollen in the Osaka cabbage (*B. Rapa* var. *amplexicaulis*) is similar to that described above but in *B. juncea* no significant difference could be found between the behaviour of self and cross pollen.

2022. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 15. Potatoes.**
US Dep. Agric. 1950 : Pp. 39. (Mimeographed).
Current projects on the breeding and utilization of the potato are listed. Examples are given of important achievements from past work.

2023. **A new potato variety is announced.**
Seed World 1951 : **69** : No. 9 : p. 34.
A new high yielding potato known as 6316 has been developed at Minneapolis University, Minn. The tubers resemble Idaho Russet but have a smooth skin similar to that of White Rose.

2024. Koopmans, A.
Cytogenetic studies on *Solanum tuberosum* L. and some of its relatives.
Genetica 1951 : **25** : 193–337.
Literature concerning hybridization within the genus *Solanum* is reviewed. In connexion with the production of varieties suitable for cultivation in the Malayan Archipelago, numerous crosses carried out at the Groningen Genetical Institute, Netherlands, have been investigated to determine interrelationships between genomes of wild and cultivated species. The completely regular meioses observed in interspecific crosses between diploids indicate that many species have homologous genomes. Details of meiotic configurations in hybrids obtained by crossing diploids with tetraploids and hexaploids, and in hybrids between tetraploids and hexaploids, are given to support the suggestion that the basic number of chromosomes in the genus is 6. Genetical data on the inheritance of corolla shape and colour, leaf shape and plant growth habit are used to show that segregations observed in numerous progenies can be more readily explained by assuming a basic chromosome number of 6 instead of 12, in which case diploids ($2n = 24$) are considered to have 4 homologous sets of chromosomes. In many crosses there is evidence that homologous chromosome sets carried by gametes of high polyploid level pair autosyndetically.
The report mentions 3 new amphidiploid species, *S. antipophureja* ($2n = 72$), *S. antipochacoense* ($2n = 72$) and *S. demissorosum* ($2n = 120$). Specimens considered to be *S. Commersonii* were obtained from Uruguay; these had 24 somatic chromosomes. The possibility that plants with $2n = 36$, previously considered as *S. Commersonii* by other workers, do not belong to this species is discussed.

2025. Bianchi, A.
La formula cromosomica del *Solanum sodomeum* L. **(The chromosome formula of *S. sodomeum* L.).**
Genetica Agraria 1951 : **3** : Nos. 1–2 : p. 179.
The chromosome number $2n = 24$ was found for the evergreen species *S. sodomeum*.

2026. **Seed potatoes.**
Dep. Agric. Scotland 1952 : Pp. 107.
This bulletin includes sections dealing with the following: (1) methods of identifying the growing plants; variations; abnormal growth forms; and roguing for purity; (2) descriptions of current commercial varieties and also of commercial varieties seldom or no longer grown and other varieties found mainly as rogues; (3) diseases, pests and other disorders, reference being made to varietal reactions; and (4) schemes for the inspection of seed stock production.

2027. Škvarnikov, P. K.
(Planting potatoes in summer with tubers previously harvested in the Crimea).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1952 : No. 1 : 36–62. [Russian].
Agrobiological methods of controlling physiological deterioration of potatoes, by planting

freshly harvested tubers in summer, were studied at the Crimean Branch Station of the USSR Academy of Sciences. The experiments involved selection of domestic varieties, wild species and interspecific hybrids and induction of early germination in material with dormancy periods by chemical means. The hybrid material was derived from crosses between domestic varieties and *Solanum canarense*, and between the former and *S. Kesselbrenneri*. These two wild species are remarkable for having no dormancy periods.
Interspecific hybrids RK–80, RK–114 and Hibinskiĭ Dvuurožaĭnyĭ [Hibiny Two Harvest] showed most promise. Their tubers germinated and grew uniformly when sown immediately after being harvested, and gave as productive material as the Crimean standards Early Rose and Lorh.
Lorh, Uljjanovskiĭ [Uljjanov], Stahanovskiĭ [Stahanov] and S–4185 showed the best response to treatment with 1–2% solution of thiourea.

2028. Taylor, C. E.
Vegetative growth of the potato plant.
Nature, Lond. 1952 : **169** : 399–400.

Observations were made on seven varieties at the School of Agriculture, University of Nottingham, England. During the first stage of development, before the formation of axillary shoots, the rate of increase in total leaf area was approximately equal in all seven varieties. Soon after the initiation of axillary shoots, however, varietal differences in growth rates became apparent, as shown by differences in increase in leaf area. Varietal differences in number of leaves per plant and maximum size of individual leaves were also recorded. The potato probably exhibits a basic growth form, characteristically modified in each variety according to the stage in the growth cycle and the rate at which the growth substances are distributed to the various organs. The varietal growth form, as expressed by increase in total leaf area, is modified by time of planting, type of seed and several environmental factors.

2029. Shâms-ul-Islam Khân
Pollen sterility in *Solanum tuberosum* L.
Cytologia, Tokyo 1951 : **16** : 124–30.

Study of the varieties Tingfan and Meitan Local revealed a diverse range of meiotic irregularities during microsporogenesis.
Date of sowing had a marked effect upon general plant vigour and thus upon regularity of meiosis. Infection by virus and fungus diseases apparently increased the frequency of meiotic abnormalities. It is therefore concluded that pollen sterility is a complex phenomenon, involving chromosomal, genic, physiological and environmental factors.

2030. Stoletov, V. N.
(The question of selection).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1952 : No. 1 : 3–35. [Russian].

In experiments at the Institute of Genetics of the USSR Academy of Sciences with the variety Silesia the plants were divided into three groups on the basis of tuber yield, and then each group was selected for small, medium, large or extra large tuber size. Yield analyses showed that the most appreciable differences in productiveness existed between the material with small tubers in each of the groups, that the differences in yielding capacity were less marked in material with medium large tubers and that they were least apparent in the large-tubered material.
In similar experiments with Maĭka [May], in which intravarietal biological variation between the clones was more extensive, differences in productiveness between the material with large tubers were also economically important.
It is concluded that tubers weighing up to 50 grm. give the most satisfactory material for clonal selection and that all sizes of tubers within the same productivity group of a variety may be used for reproduction of the clones without affecting tuber size in later generations.

2031. Page, J. O.
Potatoes for crisp-making.
J. Minist. Agric. 1952 : **58** : 525–27.

Varieties grown in Britain are discussed with regard to their suitability for crisp manufacture.

2032. Heinze, P. H., Craft, C. C., Mountjoy, B. M. and Kirkpatrick, M. E.
Variations in specific gravity of potatoes.
Amer. Potato J. 1952 : **29** : 31–37.

Over a period of four years considerable differences were noted in specific gravity determinations for six varieties grown at ten scattered localities in the US; Katahdin showed the greatest variability and Irish Cobbler and Chippewa the least. Different varieties also showed characteristic responses to storage, with respect to degree of shrinkage and changes in specific gravity.

2033. Vanasse, N. A., Jones, I. D. and Lucas, H. L.
Specific gravity—dry matter relationship in potatoes.
Amer. Potato J. 1951 : **28** : 781–91.
The interrelationship between specific gravity and dry matter content of 14 varieties grown at 4 centres in North Carolina for canning as small whole potatoes proved to be influenced by variety and location. Variability was not, however, large enough to preclude the use of specific gravity determinations as criteria of potato quality; an estimate of the error to be expected from such predictions of dry matter content is presented.

2034. Ivančenko, G. Z. and Ivančenko, E. A.
(The mentor method as a means of improving interspecific hybrids of potato).
Agrobiologija (Agrobiology) 1951 : No. 6 : 133–36. [Russian].
Breeding potatoes for high starch content at the USSR Scientific Research Institute of Alcohol Industry, Tatarinovo, Moscow province, is reported. Interspecific hybridization was effected between material with a high starch content, including Hybrid 2231, bred by Filippov, and *Solanum curtilobum* and *S. leptostigma*. An important aspect of the work was to train the hybrids so that they produced short stolons. This was done by grafting on them scions of various domestic varieties. The most promising varieties with short stolons and a starch content between 17·0% and 26·6% were obtained by grafting Oktjabrenok [Little Octobrist] on Korenevskiĭ x *S. curtilobum*, Carnea on Korenevskiĭ x *S. curtilobum*, K–1711 (BRA 6/39) on Korenevskiĭ x *S. leptostigma*, Oktjabrenok on Ostbote x Hybrid 2231, and Carnea on Ostbote x Hybrid 2231.

2035. Haigh, J. C.
A note on the viability of potato seeds.
Ann. Bot., Lond., 1952 : **16** : 317–19.
Seed collected during the potato breeding programme of the Scottish Society for Research in Plant Breeding was sampled for germination capacity. Tests were carried out on a detailed series of samples ranging from a fresh condition to an age of 52 weeks and on seed varying in age from 9 to 17 years and over. After the age of 13 years viability fell rapidly and failed altogether in seed 17 or more years old. As far as possible the factor of different ancestry was eliminated by appropriate sampling. Continued inbreeding exerted a markedly deleterious effect on germination.

2036. Rieman, G. H., Hougas, R. W. and Stokes, G.
Persistence of scab resistance in potato varieties.
Phytopathology 1952 : **42** : p. 26. (Abst.).
Experimental data have been obtained indicating that scab resistance in potatoes tends to remain constant over several years under field conditions. Evidence has also been secured showing that different physiological races parasitize resistant and susceptible varieties in the field.

2037. Waggoner, P. E.
Influence of host temperature and pathogen variability upon spread of *Phytophthora infestans*.
Iowa St. Coll. J. Sci. 1952 : **26** : 312–13. (Abst.).
A method of defining pathogenic variability of *Ph. infestans* on tomato and potato is described, in which the quantity of disease is expressed as a linear function of observed effects and interactions between host, pathogen, environment and time. Two variants were distinguished among 12 isolates from eastern and northern parts of the US; one was generally isolated from tomatoes and proved highly pathogenic on both hosts in Iowa; the other, most often isolated from potato, produced severe symptoms on potatoes alone.

2038. Mills, W. R. and Peterson, L. C.
The development of races of *Phytophthora infestans* (Mont.) deBary on potato hybrids.
Phytopathology 1952 : **42** : p. 26. (Abst.)
The occurrence of three genes for immunity from late blight, designated *B*, *C* and *D*, has been detected in the progeny of *Solanum demissum* x *S. tuberosum*. Immunity is dominant over susceptibility. As the immune plants approach maturity, immunity gives way to a high degree of resistance. Serial passages of the common field race A through plants with senescent foliage result in the development of new virulent races, highly stable and specific for the gene or genes carried by the host. Thus race B is produced by passage of race A through plants with gene *B*. Five of the expected races have been developed in the laboratory and isolated from the breeding plots. Plants of the genetic constitution *CD* or *BCD* have remained free from late blight. Failure to produce or

find races combining the virulence factors *C* and *D* suggests that these factors are allelomorphic.

2039. Black, W.
Inheritance of resistance to blight (*Phytophthora infestans*) in potatoes: inter-relationships of genes and strains.
Proc. Roy. Soc. Edinb. 1950–51 : **64** : Ser B : 312–52.

The common British strain of *Ph. infestans*, four other strains of local origin and two strains originating from Tanganyika were used at the Scottish Plant Breeding Station, Corstorphine, to determine the genetics of resistance in seedling progenies from four different breeding programmes involving *Solanum demissum*. A fourth major gene determining blight resistance in *S. demissum* has been identified in addition to three previously established independent genes, R_1, R_2 and R_3 (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 421). The newly identified gene, designated R_4, clearly accounts for deviations from standard Mendelian ratios, previously attributed to the action of incompatibility genes. Each major gene is inherited independently as a simple dominant. Three different types of deviation from the standard disomic ratios are due to unpaired chromosomes, incompatibility factors and partial autosyndesis. A series of minor genes, modifying the phenotypic expression of the major genes, differentiates grades of hypersensitivity or of susceptibility.
Mutant forms of the pathogen were found to arise frequently; thus it appears that the common British strain is a population persisting at an equilibrium determined by host range and environment; new forms survive only when appropriate host plants are available.
Since each major gene for resistance is inherited independently, the recombination of all four genes to produce economically desirable varieties having a level of blight resistance comparable with that of original wild species is a future possibility.

2040. Cooper, J. P. and Howard, H. W.
The chromosome numbers of seedlings from the cross *Solanum demissum* x *tuberosum* backcrossed by *S. tuberosum*.
J. Genet. 1952 : **50** : 511–21.

In investigations on breeding material at the Plant Breeding Institute, Cambridge, it was found that the majority of seedlings in the second, third and fourth back cross generations of [*S. demissum* ($2n = 72$) x *S. tuberosum* ($2n = 48$)] x *S. tuberosum* had chromosome numbers ranging from $2n = 49$ to 54. A third generation back cross seedling with $2n = 49$ produced progeny with more than 49 chromosomes when back-crossed by *S. tuberosum*. Study on meiosis in *S. demissum* suggested that in this species quadrivalents do not occur with a frequency of more than one per nucleus. In the F_1 of *S. demissum* x *S. tuberosum* ($2n = 60$) not more than 7 univalents were observed in most cells. Two genes for resistance to late blight occur in the Cambridge material: one gene conferring resistance to strains A and B, and another giving resistance to strains A and C. Respectively, these genes correspond to *Rb* and *Rc* postulated by Black. Many cases of irregular segregation ratios for seedlings resistant to B have been recorded; possibly the gene for resistance to A and B is carried on a chromosome which normally does not pair and forms a univalent.

2041. Akeley, R. V., Lombard, P. M. and Stevenson, F. J.
Blight-resistant potato varieties can save copper and cut cost of production.
Amer. Potato J. 1952 : **29** : 49–52.

Comparisons of yields from plots of Kennebec grown in Maine with or without application of fungicide show that this variety is resistant to local strains of *Phytophthora infestans*. Kennebec is not, however, immune from the more virulent races occurring in other states, but a number of selections possessing the required degree of blight resistance have already shown promise of desirable commercial qualities.

2042. **Results of potato variety trials.**
Leafl. Min. Agric. N. Ire. 1952 : No. 7 : Pp. 15.

Yield trials of varieties with some degree of resistance to blight, carried out at Stormont from 1937 to 1951, are reported. Short descriptive notes of the newer varieties are given.

2043. Delević, B.
(Testing the susceptibility of potatoes to potato blight).
Zaštita Bilja (Plant Protection), Beograd 1951 : No. 8 : 3–17. [Serbian].

Infection trials at the Kragujevac Institute of Agriculture with several land varieties and domestic varieties, bred at the institute, are reported. The highest degree of combined resistance of leaf and tuber to *Phytophthora* infection was shown by the land variety

Švabovac Domači [Domestic Švabovac] and by the domestic varieties Iz V and Iz 1/9.

2044. Montaldo, A. and de Royas Peña, E.
Fitomejoramiento para resistencia al tizón de la papa. (**Breeding the potato for resistance to late blight**).
Agric. Téc. Chile 1950 : **10** : 66–73.

All the Chilean wild species and local cultivated varieties tested proved susceptible to *Phytophthora infestans*. Mention is made of some hybrid material introduced from Colombia, which, it is hoped, may prove blight resistant.

2045. Pajacyk, V. V.
(Introduction of wart resistant varieties is a guarantee for success in controlling potato wart).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 12 : 54–57. [Russian].

Recently developed Soviet varieties showing resistance to wart include Oktjabrenok [Little Octobrist], Imandra, Agronomičeskiĭ [Agronomical], Zazernyĭ, Zvenjevoĭ [Detachment], Trudovoĭ [Labour], Partisan, Kalev, Kungla and Priekuljskiĭ Ranniĭ [Early Priekuli]. A batch of 30 new varieties bred for resistance to wart has reached the trial stage.

2046. McKee, R. K.
Dry-rot disease of the potato. II. Fungi causing dry rot of seed potatoes in Britain.
Ann. Appl. Biol. 1952 : **39** : 38–53.

Analyses of infected tubers during 1949 and 1950 show that *Fusarium caeruleum* is the most common cause of dry rot on popular varieties; King Edward is, however, relatively resistant to this species and bears lesions from which *F. avenaceum* is readily isolated.

2047. McLean, J. G.
Results of testing lines and varieties of potatoes for field resistance to *Verticillium* wilt.
Phytopathology 1952 : **42** : p. 26. (Abst.).

In tests carried out in Idaho, Katahdin and Seedling 41956 and their relatives and also derivatives of Jubel and other foreign varieties have shown most resistance to *Verticillium* wilt. A strong correlation was found between lateness of the variety and apparent resistance.

2048. Logsdon, C. E.
Inoculation of potatoes with ring rot tissue from different sources.
Phytopathology 1952 : **42** : p. 25. (Abst.)

Significant differences in virulence of ring rot bacteria from potato varieties which had been inoculated the previous year with inoculum from the same source are recorded. The most resistant varieties however did not always yield the most virulent inoculum. The virulence of the inoculum from some sources tended to be reversed on different varieties but such interactions were not significant.

2049. MacLeod, D. J., Bagnall, R. H. and Rankin, D. F.
Testing of potatoes for resistance to virus diseases.
Proc. Canad. Phytopath. Soc. 1951 : No. 19 : 17–18.

Testing for resistance to *Solanum* viruses 1 (virus X), 2 (Y), 3 (*A*), 4 (*B*) and 14 (leaf roll virus), carried out since 1933 at Fredericton, NB, is briefly surveyed. Immunity from virus 1 has been found in four seedlings of American origin. Field resistance or hypersensitivity to viruses 1, 2, 3 and 4 has been detected in a number of commercial varieties and new seedlings. Hypersensitivity to virus 14 has so far not been discovered. A transitory type of field resistance, lasting for varying periods up to seven consecutive seasons, has been shown by certain seedlings. Problems encountered in testing for virus resistance are listed.

2050. Keleny, G. P.
The detection of necrosis in leaf roll infected potato stems by means of fluorescence microscopy.
J. Aust. Inst. Agric. Sci. 1951 : **17** : 203–06.

The relative merits of the phloroglucinol test, and fluorochrome staining involving fluorescence microscopy, are discussed with respect to the nine varieties investigated at Canberra.

2051. Hutton, E. M. and Peak, A. R.
Inoculation techniques for studying the genetics of virus resistance in plants.
J. Aust. Inst. Agric. Sci. 1951 : **17** : 193–98.

Various modifications of inoculation techniques used in Australia are discussed with reference to the desirability of standardization to ensure accurate determination of the inheritance of resistant and susceptible genotypes in the genera *Solanum*, *Lycopersicon* and *Nicotiana*.

2052. Ramanujan, S.
Improved methods for increased production of potatoes.
Indian Fmg. 1951 : **1** : No. 9 : 10–12.

New varieties, 1219, 2236 and 1151, bred at the Central Potato Research Institute, Patna, have

shown a high degree of resistance to viruses and outyielded the local potatoes, Phulwa and Darjeeling Red Round, by 50–70% at eight trial centres.

2053. Eskola, H.
Perunan lajikekokeiden tuloksia maatalouskoelaitoksen kasvinjalostusosastolla jokioisissa vv. 1936–45. (**Results of potato variety trials at the Plant Improvement Department of the Jokioinen Agricultural Experiment Station, 1936-45**).
Valt. Maatalouskoetoiminnan Tiedonantoja, Helsinki 1947 : No. 212 : Pp. 11.
A more detailed account of the 10-year trials described in Abst. 2054 is given, but with results up till 1945 only. Experimental details are described, and results fully tabulated and statistically treated. Data on the varieties Majestic, Kungla and Vesijärvi are added.

2054. Eskola, H.
Perunakokeiden tuloksia maatalouskoelaitoksen kasvinjalostusosastolla. (**Results of potato trials at the Plant Improvement Department of the Agricultural Experiment Station**).
Maatalous 1947 : No. 1 : 10–11.
Experiments lasting over 10 years, from 1936–46, on the clay soil of the Jokioinen estate, with 12 varieties of potatoes, both Finnish and introduced, are described. Yield per hectare, starch content and keeping quality are tabulated and compared with the variety Early Rose as standard. Other characters studied include tuber shape, flavour, disease resistance and soil preferences. Of these varieties Ostbote appears the most satisfactory but has the disadvantage of late maturity. In addition some preliminary results of a further series of experiments with some introduced German varieties are given. Frühnudel appears highest yielding although set back by drought in these experiments.

2055. Kuwata, A.
(**Some new observations on sweet potato chimeras**).
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 143–46. [Japanese].
A yellow-skinned variant of the red-skinned variety Okinawa 1000 was noted; the variant produced in the next vegetative generation roots with either yellow, red, or parti-coloured skins. This behaviour is attributed either to an unstable mutation or to chimerical constitution. A chlorophyll deficient mutant was discovered in the variety Gokoku. Some of the vegetative progeny were chimerical in respect of this character.

2056. Ezell, B. D. and Wilcox, S.
Influence of storage temperature on carotene, total carotenoids and ascorbic acid content of sweetpotatoes.
Plant Physiol. 1952 : **27** : 81–94.
Significant varietal differences have been observed in respect of total carotenoid content of sweet potatoes stored at different temperatures. Carotene and total carotenoids of Nancy Hall decrease during storage at all temperatures, while similar decreases occur only at 50° F in Yellow Jersey, Porto Rico and Orange Little Stem. From 60–70° F significant postharvest increases in carotene are obvious in these varieties; Yellow Jersey, the palest at harvest, shows the maximum increase.
The ascorbic acid content decreases an equal amount in all four varieties during storage.

2057. Urrutia Nicolini, E.
El cultivo del camote en la provincia de Lima. (**The cultivation of the sweet potato in the province of Lima**).
Bol. Cent. Nac. Invest. Exper. Agric. "La Molina" 1951 : No. 40 : Pp. 28. (Mimeographed).
Data are provided on the yielding capacity of a series of Peruvian varieties, with additional information on the water, glucose and starch contents of some of the more important of these.

2058. Thurber, F. H., Gastrock, E. A. and Guilbeau, W. F.
Production of sweetpotato starch.
Crops in Peace and War. Yearb. US Dep. Agric. 1950–51 : 163–67.
The sweet potatoes Pelican Processor and White Star, suitable for industrial use, are mentioned (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1093). The possibility of developing strains simplifying problems of production is also briefly referred to. Strains of the bunch type keep down weeds; the root crowns of a bunch strain developed in Texas have proved to be strong enough to keep the potatoes together so that harvesting can be done with an ordinary digger, labour thus being saved.

2059. Anderson, W. S.
New sweetpotato variety tested at Experiment Station.
Miss. Fm. Res. 1951 : **14** : No. 6 : p. 2.
Information is given on the performance of Allgold in Mississippi (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2416).

FIBRES

2060. Gulati, A. N.
Fibre length variability of cotton.
Indian Cott. Gr. Rev. 1951 : **5** : 202–07.
A method of estimating variability percentages for fibre length, using the Baer diagram, is described; values calculated from 13 varieties are numerically similar to the irregularity percentages obtainable by the method of Ahmad and Navkal.

2061. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 10. Cotton (including cottonseed) and other fiber plants.**
US Dep. Agric. 1950 : Pp. 192. (Mimeographed).
Current projects on cotton breeding and utilization are enumerated. Some of the chief results of past work are briefly reviewed.

2062. Richmond, T. R.
Procedures and methods of cotton breeding with special reference to American cultivated species.
Advanc. Genet. 1951 : **4** : 213–45.
Breeding, mainly with reference to work on Upland cotton in the USA, is surveyed under the following headings: early history and pure line concept; recent methods and refinements, comprising type selection, replicated progeny rows, mass pedigree selection, bulked progeny tests, back-crossing and intervarietal and interspecific hybridization; hybrid vigour in the F_1 and advanced generations; and special characters of breeding value, viz. fibre properties, disease resistance, resistance to insects and other adverse factors, and adaptation to mechanical harvesting.

2063. Thomas, W. I.
Dwarf Pima cotton.
Progr. Agric. Ariz. 1952 : **3** : No. 4 : p. 9.
A short-growing variety of the Pima type has been developed which may help to overcome some of the objections to cultivating this type. It has a better ginning percentage than old Pima and fairly large bolls; the variety is still at the experimental stage. It was bred by crossing Pima with Tangüis and by further crossing with Sea Island and upland cottons.

2064. Brown, M. S. and Menzel, M. Y.
The cytology and crossing behaviour of *Gossypium gossypioides*.
Bull. Torrey Bot. Cl. 1952 : **79** : 110–25.
Tests were carried out on the behaviour of *G. gossypioides* when crossed with 11 diploid and one tetraploid species and 14 synthesized amphidiploids. Various degrees of incompatibility were shown. From crosses with species carrying D genomes, plants were obtained which died in the early cotyledon stage. Incompatibility with species having A or B genomes was less; the hybrids survived until several leaves were formed. Incompatibility was least with *G. hirsutum* $[(AD)_1]$; hybrids with this species survived until flowering. This incompatibility was distinguished by a gradual cessation of growth accompanied by internal necrosis of the stem, and finally by death of all tissue; possibly this incompatibility is due to deficiency of some essential metabolite or to an accumulation of a metabolic by-product. In spite of the failure so far to secure confirmed hybrids between *G. gossypioides* and other American wild species, the chromosome pairing behaviour of the F_1 hybrid *G. hirsutum* x *G. gossypioides* indicates that the latter species is a member of the D genome group. *G. gossypioides* is assigned to a genome designated D_6.

2065. Menzel, M. Y. and Brown, M. S.
Polygenomic hybrids in *Gossypium*. II. Mosaic formation and somatic reduction.
Amer. J. Bot. 1952 : **39** : 59–69.
Detailed analyses of the genomic constitution of complex amphidiploids having mosaic petals and leaves indicate that mosaic development is not dependent on the interaction of specific genomes. Among numerous polygenomic hybrids examined at the Texas Agricultural Experiment Station it was found that mosaics became more pronounced as the chromosome number increased. Polyploids with the same number of chromosomes showed differential mosaic development according to the number of species involved; a large number of species gave rise to complex mosaics. Hexaploids ($2n = 52$) derived from three species showed more mosaic development when one genome was duplicated than when each genome occurred only once.
Chromosome doubling by colchicine treatment failed to influence the degree of mosaic formation. Hybrids resulting from crosses between synthetic amphidiploids showed definite mosaics, but hybridization between a synthetic amphidiploid and a natural species resulted in suppression of mosaics.
Possible explanations for mosaic formation are discussed. The simplest cytological basis appears to be that of atypical mitotic segregation similar to that described by Huskins (cf. *Plant*

Breeding Abstracts, Vol. XVIII, Abst. 711 and Vol. XIX, Abst. 1594); several different forms of somatic segregation may be operative in the wide range of plants studied. The general derangement caused by complex genomic composition might result in several types of atypical chromosome behaviour in the same individual, thus explaining the occurrence of both mosaic formation and somatic reduction in different parts of a single hexaploid hybrid.

2066. Rajháthy, T.
(Some data on the improvement of cotton).
Agrártudomány, Budapest 1951 : **3** : 412–14.

The technique of cotton selection practised at the Martonvásár station is described, with special reference to vegetative period.

2067. Ivanova-Paroĭskaja, M. I.
(The work of the bee upon cotton).
Priroda (Nature) 1951 : No. 8 : p. 43. [Russian].

The attention of cotton breeders is drawn to structural differences between the flowers of early and midseason varieties of *Gossypium hirsutum*. The former, and also some *G. barbadense* varieties, have shallow calyces and are more accessible to bees.

2068. Knight, R. L.
The genetics of withering or deciduous bracteoles in cotton.
J. Genet. 1952 : **50** : 392–95.

The character of withering bracteole in *Gossypium hirsutum* has been found to depend upon a main recessive gene, *bw*. The gene has a pleiotropic action, resulting in leaf crumpling and some degree of sterility. Minor genes modify the expression of *bw*. Pollen grains with *bw* appear to have a selective advantage. The gene is of no value to breeders in the development of varieties suitable for mechanical picking, since its full expression is deleterious, or if modified only slightly deleterious, without the withering of the bracteoles.

2069. Balasubrahmanyan, R. and Santhanam, V.
Inheritance of *short lint* mutant in Cocanadas cotton.
Curr. Sci. 1952 : **21** : 16–17.

The short-linted mutant CST 1 (*Gossypium arboreum* race *indicum*), characterized by a mean combed halo length of 5 to 10 mm. and mean ginning outturn of 6 to 9%, is determined by a single gene li_{sh}, epistatic to li_e for a hairy lintless mutant. The F_2 of the cross between the short linted and hairy lintless mutants segregated in the ratio of 9 : 4 : 3 for normal lint, short lint and the lintless condition. The discovery of this new gene li_{sh} and of others affecting lint quality and density (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1982 and Vol. XXII, Abst. 2070) illustrates the importance of the Coconada zone as a centre of origin for cultivated *G. arboreum* cottons in peninsular India.

2070. Balasubrahmanyan, R. and Santhanam, V.
Inheritance of *sparse lint* mutant in Coconadas cotton.
Curr. Sci. 1950 : **19** : 60–61.

A mutant of Coconadas cotton (*Gossypium arboreum* race *indicum*) with sparse lint is conditioned by a single recessive gene li_{sp}.

2071. **Correspondence.**
Emp. Cott. Gr. Rev. 1952 : **29** : 43–46.

Correspondence between J. B. Hutchinson, Director of the Cotton Research Station, Uganda, and W. L. Balls, dealing with the application of spinning tests to assess the value of cotton varieties and selections (cf. Abst. 542), is published.

2072. Ansari, M. A. A. and Samson, S.
Degeneration studies in Perso-American variety.
Indian Cott. Gr. Rev. 1951 : **5** : 208–10.

No significant differences in mean staple length, fibre weight, date of maturity or yield were found in Perso-American cotton which was open-pollinated for three seasons; from previous observations (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1098) some degeneration was expected in a pure strain which had not been consistently selfed.

2073. Chandnani, J. J.
Cotton cultivation in Delhi.
Indian Fmg. 1951 : **1** : No. 9 : 18–19.

Trials conducted in different parts of Delhi state have shown that four varieties, M 4, F 216, F 320 and LSS, with staple length above $\frac{7}{8}$ ins., can successfully replace cotton of short staple length.

2074. Smith, H. P.
Progress in the mechanized production and harvesting of cotton in America.
Emp. Cott. Gr. Rev. 1952 : **29** : 12–20.

Contributions made by breeders to the success of machine harvesting are mentioned, with

reference to characteristics of many recently released varieties and improved strains which increase the efficiency of picker or stripper machines.

2075. Ramaswami Mudaliar, V. and Balasubramanyan, R.
The problem of 'tinnies' cotton and its solution.
Indian Cott. Gr. Rev. 1951 : **5** : 176–80.

Yield data from mixtures of Uppam (*Gossypium herbaceum* var. *acerifolium*) and Karunganni (*G. arboreum* race *indicum*) commonly grown in southern Madras are reviewed to show that Karunganni plants consistently outyield Uppam plants although the latter show a higher percentage survival and retain a healthy appearance during adverse conditions. Attempts to synthesize a Karunganni strain with wide adaptability and improved resistance to drought, wilt and flower-shedding have produced numerous promising selections, including Karunganni–2 and Karunganni–5; these are recommended to replace the original mixture.

2076. Brinkerhoff, L. A., Green, J. M., Hunter, R. and Fink, G.
Frequency of bacterial blight-resistant plants in twenty cotton varieties.
Phytopathology 1952 : **42** : 98–100.

The frequencies of plants resistant to bacterial blight occurring in relatively large populations of 18 commercial varieties and breeders' strains of upland cotton and of 2 varieties of American Egyptian cotton were surveyed. Ten varieties contained resistant plants, and with one exception also tolerant individuals. Three other varieties included tolerant plants only. Resistant plants occurred chiefly in varieties originating from Texas and Oklahoma. The highest frequency of resistant and tolerant plants, 1 in 243, occurred in the upland cotton Stormproof 1.

2077. Bird, L. S.
The importance of resistance to the bacterial blight (angular leaf spot) disease of cotton.
Plant Dis. Reporter 1952 : **36** : 3–4. (Mimeographed).

A test was carried out by the Texas Agricultural Experiment Station to estimate the loss in cotton yield due to bacterial blight. The disease caused an average loss of 18·6% in yield per acre in three susceptible varieties; Stoneville 20, a highly resistant cotton, suffered no loss.

2078. Ahmed Afifi.
Pubescent cottons for Egypt.
Nature, Lond. 1952 : **169** : 119–20.

A pubescent true-breeding offtype of *Gossypium barbadense* has been used in breeding for resistance to insect pests attacking cotton seedlings in Egypt. The type is prolific and early in maturity and gives a very high ginning outturn; its spinning qualities are however very poor. From crosses and back-crosses involving the offtype and commercial varieties, several strains have been developed with promising agronomic characters, as well as the valuable property of pubescence. Pubescence depends upon a single dominant gene. Some correlation exists between pubescence on the one hand and high yielding capacity, high ginning outturn and earliness on the other; fortunately pubescence and poor lint qualities are not associated. It is expected that in a few years strains will be sufficiently homozygous for commercial release.

2079. Dick, J. B. and Ewing, E. C. (Jun.).
Cotton variety tests in the Yazoo-Mississippi Delta, 1946-49.
Bull. Miss. Agric. Exp. Sta. 1950 : No. 476 : Pp. 15.

A summary is presented of variety trials carried out at several localities during the period 1946–49.

2080. O'Kelly, J. F., Crockett, S. P., Walton, L. and Hurt, B. C. (Jun.).
1950 cotton variety tests in hill sections of Mississippi.
Bull. Miss. Agric. Exp. Sta. 1951 : No. 477 : Pp. 7.

The results of variety trials in the hill regions are summarized.

2081. Green, J. M., Keathley, M. G., Oswalt, E. S. and Gober, N. M. (Jun.).
Oklahoma cotton varieties; varietal descriptions, and performance test results, 1945-1951.
Bull. Okla. Agric. Exp. Sta. 1952 : No. B–381 : Pp. 15.

The average results of varietal tests at four centres are summarized. Illustrated descriptions of recommended varieties are provided.

2082. Schwinghamer, E. A.
Parasitism as related to physiologic specialization in *Colletotrichum lini* Bolley.
Phytopathology 1952 : **42** : 18–19. (Abst.).

Three groups of races have been identified by means of the differential varieties Biwing,

Crystal, Punjab, Redwood, Renew and CI 463. The different behaviour of these groups in relation to the host is described.

2083. Fleischmann, R. and Bócsa, I.
Adatok a kender nemesítéséhez és az egylaki kender előállításának lehetőségéhez. (Data on hemp breeding and the possibility of producing monecious hemp).
Agrártudomány, Budapest 1951 : **3** : 214–16.

Continuous inbreeding has not proved deleterious in hemp. Several monecious types have been isolated and are to be further improved.

2084. Pereverzev, G. A.
(New varieties of jute).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. **7** : 79–80. [Russian].

Recently developed Kirgiz varieties include 064, 065, 028 and 053. All four varieties are being grown on irrigated land. Yields of up to 100 c. of stems and 20 c. of fibre have been produced per ha. The largest yield of seed, totalling 7·13 c. per ha., was produced by 028.

2085. Ghosh, T. and Basak, M.
Chlorosis in jute.
Sci. and Cult. 1951 : **17** : 262–64.

The incidence of chlorosis in jute is described; *Corchorus capsularis* is the species most affected. Chlorosis may be transmitted by grafting, and appears also to be transmitted through the seed from the female parent.

2086. Buzacott, J. H.
***Rhyparida discopunctulata* attack on jute.**
J. Aust. Inst. Agric. Sci. 1951 : **17** : 214–15.

Experimental plots of *Corchorus olitorius* growing in North Queensland have been severely damaged by this beetle; neighbouring plots of *C. capsularis* are apparently resistant. The latter species has proved suitable for the area in many other respects.

2087. Haarer, A. E.
Some observations on the cultivation of kenaf.
Econ. Bot. 1952 : **6** : 18–22.

Problems which in the author's view require the attention of the breeder are discussed, such as the development of high yielding plants which are at the same time suitable when other aspects of production are considered, suitability for completely mechanized production, breeding for fibre improvements, and development of plants specially suitable for seed purposes. It is further suggested that once the foremost problems of mechanized production and economic yield have been satisfactorily solved, more attention should be devoted to the origin of the present strains and to the possibility of collecting as good or better material elsewhere. The practical aspects of photoperiodism in kenaf are discussed, and it is suggested that study of early and late maturing strains from each latitudinal cline and use of variation in photoperiodic response to widen the critical time during which harvesting must be carried out would be valuable. Attention is also drawn to the potentialities of wild types in Africa.

2088. Vsevoložskaja, G. K.
(Vegetative hybridization of *Abutilon*).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1950 : **70** : 883–85. [Russian].

Experiments at the USSR Institute of Fibre Plants suggest that vegetative hybridization shows promise as a method of breeding *Abutilon* for high fibre yield and earliness. Changes in the growth periods and morphological characters by vegetative hybridization were obtained with Srednespelyĭ 091 [Mid-season 091] on Uljtraskorospelyĭ 20 [Ultra Early 20], Srednepozdnespelyĭ 171 [Mid-late 171] on Skorospelyĭ 085 [Early 085] and Srednespelyĭ 091 on Skorospelyĭ 085.

SUGAR AND STARCH PLANTS

2089. Pembroke, E. A.
Q.50 in North Queensland.
Cane Gr. Quart. Bull. 1952 : **15** : 105–07.

The performance of the sugar cane Q 50 (POJ 2725 x Co. 290) in different areas is discussed.

2090. King, N. J.
"The Sugar Experiment Stations Acts, 1900 to 1951." List of varieties of sugar cane approved for planting, 1952.
Cane Gr. Quart. Bull. 1952 : **15** : 102–04.

Varieties of sugar cane approved for planting in the different districts of Queensland are listed. Approved fodder canes are also listed.

2091. Loh [Lo], C.
(The improvement of Taiwan sugar cane varieties).
Taiwan Tangyeh Chikan / Taiwan Sug. J. Quart. 1951 : **3** : No. 3 : 1–16. [Chinese].

The history of sugar cane breeding in Taiwan is reviewed. Present work at the Pingtung Station on breeding canes for vigour, sugar content and resistance to drought and typhoon damage is summarized.

2092. **Proceedings of the Twenty-fifth Annual Congress of the South African Sugar Technologists' Association held in Durban and at Mount Edgecombe 10th-13th April 1951** : Pp. 106.

Papers presented at the conference included the following:—

Dodds, H. H. Notes on the development of the sugar industries of Queensland and Natal in recent years. (pp. 31–38).

Reference is made to the changing proportions of different varieties with respect to the total crop grown in Queensland and Natal during the past 16 years.

Barnes, A. C. Sugar research in the West Indies. (pp. 86–90).

A general account is given of the organization of cane breeding in the West Indies, with special reference to the research scheme centred at the Imperial College of Tropical Agriculture, Trinidad, and to the work undertaken at the British West Indies Central Sugar Cane Breeding Station, Barbados.

King, N. C. Methods and results of sugarcane mosaic resistance and tolerance tests. (pp. 99–101).

A summary of this paper has already appeared in Abst. 578.

2093. **Research work. Sugar-cane agriculture 1950.**
B.W.I. Sug. Ass., Trinidad 1950 : Pp. 17.

Cytological investigations, hybridization, selection and varietal trials carried out in the British West Indies from 1949 to 1950 are briefly summarized (cf. Abst. 1303).

2094. Stevenson, G. C.
New horizons in sugar cane breeding.
Proc. 1950 Mtg. BWI Sug. Technol. 1950 : 125–31.

Sugar cane breeding is discussed, mainly with reference to work in the British West Indies.

2095. Saint, J.
Sugar cane breeding in Barbados.
Brit. Agric. Bull. 1952 : **4** : 319–23.

Various aspects of past and present breeding work are surveyed.

2096. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 16. Sugar (molasses and sirups).**
US Dep. Agric. 1950 : Pp. 52. (Mimeographed).

Current projects on the breeding and utilization of sugar beet, sugar cane and sorgo and past achievements in the improvement of these crops are briefly surveyed.

2097. Stokes, I. E., Ashley, T. E., Kuykendall, R. and Hurt, B. C.
New sugar cane variety released after four years of testing in Mississippi.
Miss. Fm. Res. 1951 : **14** : No. 4 : 1, 8.

CP **36/111** has been released for syrup production in Mississippi. It has equalled or surpassed CP **29/116** in production of syrup per ton of cane and per acre and in stubbling properties. It has consistently produced syrup with good quality. It has shown no important damage from mosaic, red rot and other diseases.

2098. Mangelsdorf, A. J.
Sugar cane breeding in Hawaii.
Proc. 1950 Mtg. BWI Sug. Technol. 1950 : 150–58.

Sugar cane breeding in Hawaii is described, detailed information being given on the breeding collection, crossing technique, method of propagation and testing procedure.

2099. Raghavan, T. S.
The genetical behaviour of *Sclerostachya* x *Narenga* hybrids and their back-crosses.
Curr. Sci. 1952 : **21** : 35–36.

Certain morphological characters present in *Narenga*, such as a circle of hairs at the nodes of flowering culms and the occurrence of pedicelled and sessile spikelets, proved dominant in progenies of reciprocal crosses between *Narenga* and *Sclerostachya* investigated at Coimbatore; absence of hairs on the upper surfaces of the leaves and absence of nodal buds on flowering culms, both typical of *Sclerostachya*, were also characteristics of the interspecific hybrids. Selfed progenies showed no appreciable segregation for these characters, indicating

relatively homozygous constitutions. Progenies of hybrids back-crossed to their respective parents gave expected ratios of individuals dominant or recessive for characters whose presence in *Narenga* was dominant. In respect of hairs on upper leaf surfaces or nodal buds on flowering culms, however, progenies resulting from back crosses to the recessive parent *Narenga* all showed the recessive characteristic instead of the expected 1 : 1 ratio. Further analyses are to be undertaken.

The inheritance of the same morphological characteristics in *Ikra* shows sufficient similarity to confirm the suggestion that it may have arisen by natural hybridization between *Narenga* and *Sclerostachya*.

2100. Dutt, N. L. and Thuljaram Rao, J.
Coimbatore canes in cultivation.
Indian Cent. Sugarcane Comm., New Delhi 1950 : Pp. 82.

Full morphological descriptions supplemented by illustrations are given of 20 Coimbatore varieties of sugar cane grown commercially in India. A distribution map and an identification key are included.

2101. Lima, C. C. de A.
Variedades de cana mais recomendáveis para Pernambuco. **(The sugar cane varieties most suitable for Pernambuco).**
Brasil Açucareiro 1950 : **35** : 520–24.

Data are provided on the yield and sugar content of the juice of varieties recommended for Pernambuco.

2102. **Fifty-first annual report of the Bureau of Sugar Experiment Stations, Queensland 1951** : Pp. 55.

The probability that breeding material collected from New Guinea during 1951 (cf. Abst. 568) will lead to the production of valuable new varieties in Queensland is stressed. This indicates the desirability of further expeditions to New Guinea and neighbouring islands so far not exploited by cane collectors.

Reports from the experiment stations refer to the continuation of trials of introductions, recently developed seedlings and ratoon selections for disease resistance and adaptation to different localities (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2009). Some 200 crosses were effected at Meringa using as many early maturing varieties as possible, including the South African cane N:Co. 310 and the CP varieties 29/320, 34/13 and 36/105. Arrowing was delayed in several varieties by installing a lighting system in the field to prolong the photoperiod; these canes were then crossed later in the season than usual.

Crosses, made in the previous year, from which the largest number of promising seedlings were selected included: G 323 x Badila, Q 10 x Q 27, Q 13 x Eros and Q 13 x POJ 2878 at Meringa; Q 27 x Badila at Babinda; POJ 2878 x Co. 290 at Mackay; and G 217 x POJ 2878, Trojan x Q 36 and D 209 x Q 31 at Bundaberg.

2103. D., H. H.
Sugar cane research in Louisiana. Interesting results of variety and fertilizer trials.
S. Afr. Sug. J. 1951 : **35** : 773–75.

Results of recent field trials in different parts of the state are summarized. An introduction from South Africa, N:Co. 310 (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 561), combined high cane yields with high sucrose content, and has been selected for further trial. High yielding CP varieties with resistance to red rot included 44/101, 43/47 and 36/105 (cf. Abst. 199).

2104. Luke, W. J. (Jun.).
Result of varietal trials at Central Romana in the Dominican Republic.
Proc. 1950 Mtg. BWI Sug. Technol. 1950 : 73–83.

Information is given on the yield and quality of POJ 2878, B 37–161, B 34–104, Mayagüez and other canes.

2105. Vinogradov, N. V. and Vostokov, A. I.
(The development of sugar and syrup making in the USSR from sugar-bearing plants other than sugar beet).
Saharnaja Promyšlennostj (Sug. Beet Indust.) 1951 : No. 3 : 8–14. [Russian].

Reference is made to the sweet sorghum varieties Stavropoljskiĭ 96 and 98 [Stavropolj 96 and 98], developed at the Stavropolj Breeding Station. They yield 470 c. green matter per ha. and have juice with a 20·9% sugar content.

2106. Dusseau, A.
Les effets de la tétraploïdie chez le sorgho sucrier. **(The effects of tetraploidy in sweet sorghum).**
C.R. Acad. Sci. Paris 1945 : **220** : 96–97.

Colchicine-induced tetraploid strains of sweet sorghum have been obtained and tested against the corresponding diploids at Bordeaux and Bergerac. The tetraploids were shorter and later than the diploids but had a considerably higher sugar content.

2107. **New sorgo variety produced in state yields well and makes high quality sirup.**
Miss. Fm. Res. 1951 : **14** : No. 3 : p. 1.

STOKES, I. E. *ET AL.*
Sart developed in six-year test of hundreds of seedlings at four locations.
Ibid. 1951 : **14** : No. 3 : 1, 6.

The late maturing variety Sart (cf. Abst. 1304) has been released for syrup production in Mississippi. It has consistently produced syrup with high quality, and has surpassed Hodo in yield of syrup per ton of stalks and equalled or exceeded this variety in yield of syrup per acre. It is resistant to lodging and *Colletotrichum graminicolum*. Sart originated from seed collected in the Kordofan Province of the Anglo-Egyptian Sudan.

2108. MELJNIK, M. K.
(One hundred and fifty years of sugar beet cultivation).
Saharnaja Promyšlennostj (Sug. Beet Indust.) 1951 : No. 9 : 16–19. [Russian].

Reference is made to adapted productive varieties which have been developed at the Verhnjačka, Ivanovka, Uladovka, Ljgov, Ramonj and Belaja Cerkovj Breeding Stations. These include the standards R–1537, R–47, R–306 and R–407, with a 6–8% higher sugar extraction rate than other varieties.

2109. ORLOVSKIĬ, N. I.
(The reserves for increasing the productiveness of sugar beet).
Saharnaja Promyšlennostj (Sug. Beet Indust.) 1951 : No. 7 : 42–44. [Russian].

Experiments at the USSR Scientific Research Institute of Sugar Industry showed that large seed developed into more vigorous plants producing heavier roots than smaller seed from the same seed cluster. Selection during thinning for vigour improved yielding capacity of the material in the next generation.

2110. ČERNENKOV, A. D.
(Sowing sugar beet in late autumn in the Non-Black-Earth Zone).
Saharnaja Promyšlennostj (Sug. Beet Indust.) 1951 : No. 10 : 42–44. [Russian].

Mičurinite breeding for productiveness and resistance to bolting in Latvia and Lithuania has begun. The methods include sowing in late autumn and continuous selection of non-bolting types. Reference is made to the standards M–2 and U–7–52 producing large well-shaped roots. These varieties produce a high percentage of nonbolting plants.

2111. OČERETJANYĬ, V. A.
(The effects of injury to the roots of sugar beet upon heritable properties of the seed).
Saharnaja Promyšlennostj (Sug. Beet Indust.) 1950 : No. 12 : 36–38. [Russian].

Experiments at the Frunze State Farm, Kirgizia, showed that mechanical injury to the crown or apical portions of the roots, crown gall, and propagation of the roots by division changed the heritable properties of the material. The plants from the seed from such roots produced fewer roots and less sugar than the seed of normal healthy roots.

2112. PUZIKOV, D. N.
(For Mičurinite theory in breeding and seed growing).
Saharnaja Promyšlennostj (Sug. Beet Indust.) 1948 : No. 11 : 11–15. [Russian].

Soviet Darwinism and agrobiology as advocated by Lysenko are supported and formal genetics rejected. In sugar beet breeding, Mičurinites reject various theoretical limitations to the production of varieties with higher yield and higher sugar content than the present varieties. Mention is made of the productive sugar beet varieties, R 1537 and R 306, whose sugar contents were appreciably increased at the Ramonj Breeding Station and of two varieties with a high sugar content, V1612 and 1724, whose yielding capacity was greatly improved at the Verhnjačka Breeding Station.

2113. STOUT, M., MCBIRNEY, S. W. and FORT, C. A.
Developments in handling sugar beets.
Crops in Peace and War. Yearb. US Dep. Agric. 1950–51 : 300–07.

Recent developments in harvesting, storing and processing sugar beets in the USA are discussed. It is mentioned that breeding for improved storage properties appears to be promising, since varietal differences in rate of spoilage have been detected.

2114. OČERETJANYĬ, V. A.
(The effect of the crop preceding sugar beet in the rotation upon the heritable properties of the sugar beet seed).
Saharnaja Promyšlennostj (Sug. Beet Indust.) 1951 : No. 8 : 45–46. [Russian].

The seed of V–25 and R 1537 gave rise to plants with a higher root yield and sugar content

when the predecessor was lucerne than when it was winter wheat.

2115. Orlovskiĭ, N. I.
(The improvement of sugar beet varieties).
Saharnaja Promyšlennostj (Sug. Beet Indust.) 1949 : No. 12 : 33–37. [Russian].
Selection is the principal method of obtaining productive varieties of sugar beet with a high sugar content and other good economic properties at the Uladovka, Ljgov, Verhnjačka and Ramonj Breeding Stations, although intravarietal hybridization involving material of different origins has also given higher yields of roots and sugar.
The aims in selection are large root and higher sugar content and the elimination of unproductive types and material susceptible to bolting and various diseases.
A new method of analysing the material for its sugar content during the stage of the fourth and fifth leaf pair is mentioned.

2116. Krasnoščekov, I. M.
(The resistance to *Botrytis* of bolting and woody roots of sugar beet).
Saharnaja Promyšlennostj (Sug. Beet. Indust.) 1948 : No. 6 : 41–44. [Russian].
At the Uladovo-Ljulinec Breeding Research Station, sugar beets susceptible to bolting and to the development of woody roots showed a lower degree of resistance to *Botrytis cinerea* than beets with nonwoody roots or nonbolting plants.
Selection of nonwoody and nonbolting material is advocated as a preliminary to breeding varieties resistant to diseases.

2117. **(The 60th anniversary of a breeding station).**
Saharnaja Promyšlennostj (Sug. Beet Indust.) 1949 : No. 7 : p. 41. [Russian].
Breeding work with sugar beet at the Uladovo-Ljulinec Breeding Research Station, Vinnica province, is briefly discussed. Recently developed varieties include U 1722, U 1718 and U 552 E. The latter was obtained by hybridization and shows resistance to bolting and storage diseases, caused by *Botrytis* and other microorganisms. U 552 E is a productive variety with a satisfactory sugar content.

2118. McVickar, G. E.
New sugar beet has high sucrose content.
Crops and Soils 1952 : 4 : No. 4 : p. 25.
The US Department of Agriculture has released a new variety, US 35–2 (formerly SL 824), combining high sucrose content with resistance to curly top. It is suitable for intermontane districts and for spring planting in southern and central California where it outyields the widely grown US 22–3.
A high degree of curly top resistance can be obtained in otherwise desirable varieties, without detriment to sugar content, by back-crossing to the new variety.

2119. Tidbury, G. E.
Cassava varieties.
Bull. Dep. Agric., Zanzibar 1951 : Pp. 9. (Mimeographed).
A summary is included of trials carried out in Zanzibar to study the virus resistance, yielding ability and palatability of interspecific hybrid selections of cassava, received from Amani.

STIMULANTS

2120. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 17. Tobacco.**
US Dep. Agric. 1950 : Pp. 52. (Mimeographed).
Information is included on current projects on tobacco breeding and utilization. Important achievements of past work on improvement are briefly described.

2121. Bolsunov, I.
Erzeugung von ultra-ertragreichen Sorten als aktuelle Aufgabe der modernen Tabakzüchtung. **(Production of exceptionally high yielding varieties as the task of the moment in modern tobacco breeding).**
Fachl. Mitt. Öst. Tabakregie 1952 : No. 1 : 6–16.
The gigas forms giving extra high yields which have been found in various countries are described; the author has also confirmed the occurrence of gigas and semigigas spontaneous mutants in many Eastern European oriental tobaccos and in the progeny of crosses; he never found a true gigas mutation of *Nicotiana rustica*, only mutants showing quantitative alteration of leaf surface and height of stem.
Work on the application of transgression breeding to the production of high yielding forms is described; other research aims at obtaining new constant forms of practical importance, in which the yield is to increase steadily till giant or super giant races, promising for cultivation,

are produced. The methods found effective in transgression breeding for increased yield are set out. Diagrams show the pedigrees of two new high yielding types, Antheus (*N. Tabacum*) and Mahorka-Recke (*N. rustica*), both of which gave record yields. Antheus was obtained by (1) progressive crossing, (2) fixation of heterosis, (3) hybridization using races of widely differing geographical origins and (4) crossing with gigas forms; Mahorka-Recke was obtained as the result of processes (1), (3) and (2), in this order.
In the case of semioriental tobaccos the prospects of breeding giant forms are promising. The superior yields of some of the new Virginia gigas varieties e.g. Great Virginia, Virginia Herkules and Grüner Prinz are tabulated. Provisional examination also showed that the leaf of the new gigas varieties is of good colour and has the qualities of a mild filler tobacco of Virginia type. The new giant, cigar tobaccos, Rex and Grandus, give yields twice as great as some of the well known cigar tobaccos; other gigas varieties for cigar and pipe tobacco of the alkaline type are Basileus and Goliath. The harvest time of these giant tobaccos coincides at the beginning with that of other cigar varieties, but is two or three weeks later for the topmost leaves.
In breeding high yielding Burley forms the aim is to try to combine good quality of leaf with resistance to drought, wet, diseases and deficiencies of the soil. The yields already obtained from some of the new Burley type giants are about twice as great as from Burley and varieties of the Burley type from Switzerland, Spain and USA. The harvest time of these new giant forms of Burley begins at the same time as that of other Burley varieties.

2122. Relazione tecnica. Campagna 1950. (**Technical report. Season 1950**).
Tabacco 1951 : **55** : 251–58.

According to this report of the Scientific Research Institute for Tobacco, Rome, selection of Kentucky tobaccos has been continued in the Verona region, including a promising line of Kentucky indigeno [Indigenous Kentucky] and a new line of Kentucky Perucci, derived from a very early, tall plant with large leaves. Pedigree selection of the subtropical types Resistente 142 and 945 is also proceeding.
In a study of hybrid lines, those with Perustitza gigante as the pollen parent seem to be early, productive and of finer texture.
Crosses of 2D, which is superior in combustibility, are being made with the main cultivated tobaccos.
At Scafati, detailed genetical and morphological data are being collected on the species and varieties grown there. Maryland and both forms of Hybrid No. 4 are undergoing selection.
At Lecce lines of Levantine tobaccos are being purified, an aim already achieved with regard to Erzegovina 93/1, Perustitza 107 x Xanthy 94/II.
Dojmi's new method of selection is being used for lines 22, 19 and 88 of Virginia Bright brand A/16 and a study is being made of their distinctive genotypic and phenotypic characteristics. The progeny of the F_1 have proved remarkably uniform morphologically, very productive, and easy to grow, with a high output of yellow leaf and other good qualities. Line 22 is the best.
Oriental tobaccos are undergoing line selection at Lanciano.
Disease resistance, fermentation and the improvement of combustibility are the object of further studies.

2123. Perucci, E.
Per ottenere una buona produzione di tabacchi da fascia. Azione agronomica e genetica. (**How to produce good wrapper tobaccos. Agronomic and genetic measures**).
Tabacco 1951 : **55** : 285–98.

Efforts are being made to obtain by hybridization new varieties like Sumatra but with shorter internodes, fewer leaves, and cylindrical in habit and adapted to diverse ecological conditions. The Bulgarian mutant Perustitza gigante, which under favourable conditions may be two metres high, with over 80 leaves and short internodes, especially in the upper part of the crown, is being used as pollinator. The last named character is transmitted in the hybrids from the F_1 onwards and can be fixed in the new varieties in a more marked degree.
Hybrids from Perustitza gigante may be very early in developing, and extremely so in the F_1, so that the middle leaves, more suitable for wrapper tobacco, can be harvested 50 days after transplanting and before flowering begins. Other desirable features are a fine elastic texture of leaf, in which the veining is not marked, and sometimes an increase in the number of leaves. The hybrid plants from the cross Round tip x Perustitza gigante (Sumatra 24) have shown medium development, with leaves of very good texture and veining not very marked and they can therefore be expected to give a high yield of wrapper leaves; also, the shortened internodes afford good shade for the crown leaves, so that the plant becomes almost cylindrical in shape.

The cross Sumatra 44 (Sumatra x Perustitza gigante) is regarded as a promising wrapper type, superior to Sumatra 24; its shorter internodes, higher number of leaves, of almost equal size and almost horizontally placed, and its cylindrical shape are found in association with broader, ovoid leaves, with rounder tips than in Round Tip.

2124. MELCHERS, G.
Mammut-Tabak mit frühreifen Blättern. **(Mammoth tobacco with early maturing leaves).**
Züchter 1951 : **21** : 353–56.

Crosses have shown that, as compared with the neutral day habit of the variety Cavalla, the short-day habit of Maryland Mamut [Maryland Mammoth] is conditioned by a recessive allelomorph. Early yellowing of the leaves in Cavalla, as compared with the nonyellowing found in Maryland Mammoth is due to the action of two independent recessive allelomorphs, which are also independent of the gene controlling photoperiodic reaction. Hence in the F_2 from Cavalla x Maryland Mammoth, 1 in 63 plants should combine early maturing leaves with absence of flower formation in summer. Of further interest to the grower is the finding from a comparison of 10 F_3 families of this new combination, that further selection for absence of lateral shoots during the main period of vegetation seems promising.

2125. GRANT, K. T.
Hybrid vigour in flue-cured tobacco.
Lighter, Ottawa 1952 : **22** : 11–13. (Mimeographed).

At the Dominion Experimental Substation, Delhi, Ontario, F_1 hybrids from Virginia Gold x Delcrest were more vigorous and produced a greater number of marketable leaves than either parent. Hybrid leaves resembled those of Delcrest in shape but their quality proved slightly inferior to that of either parent; hybrid yields equalled the outstanding yields of Virginia Gold.

2126. LEFÈVRE, J. and PANYALAKSHANA, P.
Comportement caryologique d'hybrides et de nouvelles espèces amphidiploïdes dans le genre *Nicotiana*. **(Caryological behaviour of hybrids and new amphidiploid species in the genus *Nicotiana*).**
C.R. Acad. Sci. Paris 1946 : **222** : 336–38.

Meiosis is described in the following hybrids and the corresponding fertile amphidiploids: *N. Tabacum* x *N. glauca*, *N. rustica* x *N. glauca* and *N. Tabacum* x *N. sylvestris*. It is noted that varietal differences in the parents may affect meiotic behaviour.

2127. FARDY, A. and HITIER, H.
Formes amphidiploïdes du genre *Nicotiana* obtenues par l'action de la colchicine. **(Amphidiploid forms of the genus *Nicotiana* obtained by means of colchicine).**
C.R. Acad. Sci. Paris 1945 : **220** : 215–53.

Cytological and morphological descriptions are given of the following fertile amphidiploids: *N. Bigelovii* x *N. glutinosa*, *N. glauca* x *N. Langsdorffii*, *N. glutinosa* x *N. glauca*, *N. suaveolens* x *N. Bigelovii*, *N. suaveolens* x *N. plumbaginifolia*, *N. rustica* x *N. Bigelovii*, *N. Tabacum* x *N. glauca* and *N. Sanderae* x *N. plumbaginifolia*.

2128. HITIER, H. and FARDY, A.
Descendance d'espèces tétraploïdes et d'hybrides interspécifiques amphidiploïdes du genre *Nicotiana*. **(Later generations of tetraploid species and interspecific amphidiploid hybrids of the genus *Nicotiana*).**
C.R. Acad. Sci. Paris 1945 : **220** : 120–22.

The later generations of the colchicine-induced tetraploid species obtained by the authors (cf. Abst. 1316) fluctuated somewhat in chromosome number, and minor irregularities were noted at meiosis. The tetraploids also proved more sensitive to environmental factors than the diploids. Some of the amphidiploids obtained were highly stable cytologically; in other cases meiosis showed some irregularities.

2129. HITIER, H. and FARDY, A.
Hybrides polygénomiques de *Nicotiana*. **(Polygenomic hybrids of *Nicotiana*).**
C.R. Acad. Sci. Paris 1945 : **221** : 453–56.

A series of triple and quadruple interspecific hybrids have been obtained by crossing amphidiploids with a third species and by intercrossing different amphidiploids respectively. Polyploid derivatives of these multiple hybrids were also obtained by colchicine treatment. The triple and quadruple haploids were generally sterile, and colchicine treatment only brought about a partial restoration of fertility. In two cases the presence of a third genome enabled two other genomes to be combined, which could not be hybridized directly; thus *N. glauca* and *N. sylvestris* were combined in the presence of *N. glutinosa*, and *N. rustica* and *N. glutinosa* were combined in the presence of *N. Bigelovii*.

2130. Deĭmontovič, B. I.
(Artificial self pollination of tobacco).
Agrobiologija (Agrobiology) 1951 : No. 5 : 141–42. [Russian].
Intravarietal open pollination of several varieties at Starodub has given material with better economic characters than artificial self pollination of the same varieties. Gundi, yielding more leaves when selfed, was a single exception. Reference is made to abnormal plants without inflorescences, produced by the inbred varieties Hmelovka 125 and V–Zelenaja 317 [V–Green 317] at the Lohvickaja Breeding Station. Similar anomalies were observed in inbreds of the *Nicotiana rustica* variety Lohis (Hmelovka 125 x Omega). The proportion of abnormal plants was appreciably reduced when open pollination replaced artificial self pollination.

2131. Smith, H. H.
Relation between sterility and morphological characters in an interspecific *Nicotiana* cross.
Genetics 1951 : **36** : p. 576. (Abst.); and 1952 : **37** : 26–38.
Pollen sterility and three dimensions of the corolla were analysed in the F_2 and BC_1 generations of *N. Langsdorffii* x *N. Sanderae* and found to depend upon multiple genes. The data suggested that the genes for pollen sterility and those conditioning corolla morphology are distinct but linked. Gamete elimination, as measured by pollen abortion, was of relatively little significance in the differential restriction of gene recombinations for corolla size appearing in the F_2.

2132. Valleau, W. D.
Breeding tobacco for disease resistance.
Econ. Bot. 1952 : **6** : 69–102.
Breeding in the USA and elsewhere for resistance to the following diseases and pests is surveyed: *Thielaviopsis basicola, Phytophthora parasitica* var. *Nicotianae, Peronospora tabacina, Fusarium* wilt, *Erysiphe cichoracearum,* bacterial wilt, wildfire and angular leaf spot, mosaic, etch and veinbanding viruses, streak virus, nematodes and broomrape.

2133. Clayton, E. E. and Grosso, J. J.
Testing methods for the evaluation of combinations of disease resistance in tobacco.
Phytopathology 1952 : **42** : p. 5. (Abst.).
A typical schedule of testing found valuable in breeding for combined resistance to several diseases is outlined. The diseases referred to comprise *Thielaviopsis basicola, Peronospora tabacina, Pseudomonas tabaci,* mosaic and *Alternaria longipes.*

2134. Johnson, J. and Fulton, R. W.
Tobacco wildfire resistance in Wisconsin.
Phytopathology 1952 : **42** : p. 12. (Abst.)
The resistant selection TL 106 was crossed with Wisconsin types of Havana resistant to black root rot; TL 106 was derived from a cross between *Nicotiana longiflora* and *N. Tabacum.* Backcrossing has given continued improvement in agronomic characters with maintenance of disease resistance. Progress is also being made in combining mosaic resistance with resistance to wildfire and root rot.

2135. Fulton, R. W. and Johnson, J.
Mosaic resistance in Wisconsin tobacco.
Phytopathology 1952 : **42** : p. 8. (Abst.).
The necrotic local lesion type of resistance to mosaic has been incorporated in hybrids closely resembling Havana Seed. Mosaic resistance and chlorophyll characters are independently inherited. Selected F_5 lines from the original cross are apparently equal or superior with respect to commercial type, quality and yield when compared with lines back-crossed four times to the commercial parent. In small scale trials lines have shown commercial acceptability and very satisfactory mosaic resistance.

2136. Stover, R. H.
Association in tobacco of the severe symptom response to etch virus and the white burley character.
Phytopathology 1951 : **41** : 1125–26.
The severe injury caused by etch virus in white burley has been found to be associated with the recessive duplicate genes, g_1 and g_2, controlling the character of low chlorophyll content in this type of tobacco.

2137. Hutton, E. M.
An age-induced variation in susceptibility to virus X in *Nicotiana tabacum* L.
Aust. J. Sci. Res. Ser. B 1951 : **4** : 450–60.
Susceptibility to virus X decreased with the age of the inoculated tobacco plants, irrespectively of genotype. Probably the reduced susceptibility was associated with metabolic changes in the host which were inhibitory to virus multiplication. It is emphasized that in the evaluation of progenies for virus resistance the factor of maturity should be controlled.

2138. Valleau, W. D.
The evolution of susceptibility to tobacco mosaic in *Nicotiana* and the origin of the tobacco mosaic virus.
Phytopathology 1952 : **42** : 40–42.

The author suggests that the reactions to tobacco mosaic virus occurring within the genus *Nicotiana* originated without the intervention of the virus, in contrast to the hypothesis of Holmes (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2050). The reactions of modern species of *Nicotiana* could have arisen through mutations of *N* for necrotic spotting and of *A* for susceptibility, assuming that the progenitor of the genus possessed the genotype *NNAA*. Tobacco mosaic, it is further suggested, made its appearance as a disease of tobacco when the plant was first cultivated by man in proximity with the plantago mosaic virus; gradual mutation of the latter virus in tobacco resulted in the numerous strains of tobacco mosaic recognized to-day.

2139. Schweizer, J.
Aanbevolen theeplantmateriaal 1951/52. (**Recommended planting material of tea 1951–52**).
Bergcultures 1951 : **20** : 399–405.

Tea selection in Java began in 1913 with the work of C. Stuart under the Central Association for Experimental Stations, and the first list of recommended varieties appeared in 1949. The criteria on which the selection of these recommended clones was based were applied at Pasir Sarongge, where all the clones listed gave good yields.

Comparing clones and populations, Van der Knaap has found the variation in yield in certain periods to be greater in the former than the latter, a finding which may affect the use of monoclone blocks.

It is shown that clonal differences in branching habit can be turned to practical advantage in plantations.

2140. Krug, C. A. and Carvalho, A.
The genetics of *Coffea*.
Advanc. Genet. 1951 : **4** : 127–58.

This review mainly collates the numerous papers by the authors and their colleagues describing investigations on the classification, methods of reproduction, cytology and genetics of *Coffea* carried out at the Instituto Agronômico, Campinas, São Paulo, Brazil. It includes some unpublished data. The section on genetics deals chiefly with chromosomal and genic mutants of *C. arabica* studied at the institute during the last two decades. Several of the recessive mutants are of economic importance. Cytoplasmically inherited characters in *C. arabica*, the genetics of species other than *C. arabica* and interspecific hybrids are also referred to. The significance of these cytological and genetical investigations in breeding *C. arabica* is indicated.

2141. Schweizer, J.
Aanvullende gegevens over BP-Robustakoffie als plantmateriaal. (**Supplementary information on BP Robusta coffee as planting material**).
Bergcultures 1952 : **21** : 61–69.

This report contains a table showing the yields of many Robusta BP clones and of a number of SA and Robusta Bgn clones at the Besuki Experimental Station in Java. Descriptive notes on the bean size and performance and special aptitudes of six selected BP clones are also included. BP 46 and BP 358 are recommended to planters.

2142. **Twentieth Quarterly Report of the West African Cacao Research Institute, Tafo, April-June 1949** : Pp. 23. (Mimeographed).

Progenies of crosses between the Upper Amazon cacao types Nanay and Parinari were significantly more resistant to swollen shoot infection resulting from vector feeding on the cotyledon than the Amelonado controls originating from the Lower Amazon region. Amelonado seedling stocks have been budded from clone E 1; cuttings of this clone are also being established; the offspring of E 1 have so far proved the highest yielding in the first progeny trial.

2143. Wilson, J.
The breeding of cacao.
J. Agric. Soc. Trinidad and Tobago 1951 : **51** : 303–14.

The techniques and aims of breeding at the Imperial College of Tropical Agriculture, Trinidad, are outlined.

2144. **Twenty-second Quarterly Report of the West African Cacao Research Institute, Tafo, October-December 1949** : Pp. 16. (Mimeographed).

The results of the analysis of variation in butter fat and alkaloid content within and between trees of a population of West African Amelonado cacao are reported. For both constituents differences between trees were greater than those for any single tree. Similar analyses of populations of Parinari x Nanay and clonal material designated TF 2 and comprising Trinitario trees of unknown parentage are proceeding.

2145. **Twenty-fourth Quarterly Report of the West African Cacao Research Institute, Tafo, April-June, 1950**: Pp. 15. (Mimeographed).

Controlled pollinations to test self and sib compatibility have been carried out on high yielding cacao trees of the Upper Amazon type. No fruit set has been obtained by selfing or sibbing *Theobroma* spp. other than *Th. Cacao*. *Herrania* spp. are self compatible, setting fruit freely. Evidence of almost complete self pollination in *Herrania* has been secured. Sets have resulted from pollination of an Upper Amazon cacao type by *Herrania* spp. Stringent tests of resistance or immunity to virus IA have been initiated, using the Nanay and other types showing promise in preliminary tests.

2146. Grümmer, G.
Beiträge zur Eigenschaftsanalyse der Anfälligkeit von *Papaver somniferum* gegen *Helminthosporium papaveris*. (**Contributions to the analysis of the property of susceptibility to *H. papaveris* in *P. somniferum***).
Züchter 1951 : **21** : 306–22.

A full description is given of the disease and its symptoms and conditions of infection; chlorotic plants were more prone to infection than green plants. The effects of the parasite are due to a toxin, which proved effective against all members of the Papaveraceae tested, and also against the Chenopodiaceae and, to a lesser degree, the Cruciferae and Solanaceae and members of certain other families. The effects of the toxin on cut shoots of tomatoes are described. Although all *Papaver* species were susceptible to the effects of the toxin, some of them proved resistant to attack by the fungus, showing that other factors were also operative in determining susceptibility and resistance. Necrosis is in this case a sign of infection and there is no sign of a necrotic resistance as occurs with potato blight.

2147. Procházka, F.
Souvislost některých morfologických znaků máku s množstvím a velikostí semene, vzdorností proti napadání černí makovou (*Cladosporium herbarum*) a využití těchto poznatků při zušlecht'ování. (**The relation between some morphological characters of poppy and the number and size of its seed and its resistance to black rot of the capsule (*C. herbarum*) and the application of these observations to breeding**).
Sbornik Čsl. Akad. Zeměd. 1952 : **25** : 13–20.

The yield of seed is related to the number of capsules borne by each plant, but the selection of plants with fewer capsules containing larger amounts of seed is recommended because of more uniform maturation and greater ease of harvesting such material. Oblong and cylindrical capsules proved the most satisfactory for normal development of seed, because of the larger surfaces exposed to sunlight. Productiveness was associated with large size of capsules, many large stigmatic rays and many locules.
Plants with capsules having a drooping habit were more susceptible to *C. herbarum*.

2148. Escauriaza, R. de, and Pérez Valera, F.
Contribución al estudio del valor cervecero de los lúpulos cultivados en España. (**Contribution to the study of the brewing quality of the hops cultivated in Spain**).
Bol. Inst. Nac. Invest. Agron., Madr. 1951 : **11** : 415–28.

Data are provided on the chemical composition, including resin content, of a series of introduced hop varieties and of three wild Spanish hops from Betanzos.

MINOR CROP PLANTS

2149. Evans, M. and King, T. H.
The importance of the stylar region of the pepper fruit in the control of fruit disease.
Phytopathology 1952 : **42** : p. 7. (Abst.).

Selection for absence of a definite hole in the stylar end of the fruit offers a means of obtaining resistance to internal fruit rot.

2150. Smith, P. G. and Minges, P. A.
Resistance of strains of California Wonder pepper to *Phytophthora* root rot.
Plant Dis. Reporter 1951 : **35** : p. 509. (Mimeographed).

Marked differences in susceptibility to *Ph. Capsici* have been observed among strains of the California Wonder type in a trial in the Merced area of California.

2151. **New, high yield pepper is mosaic resistant.**
Sth. Seedsman 1952 : **15** : No. 2 : p. 56.

Yolo Wonder, a sweet pepper developed at Davis, Calif., from California Wonder x Elephant Trunk, combines the desirable fruit quality of the former with the mosaic resistance of the latter. The new pepper produces much larger

fruits than its female parent which it has outyielded in different parts of the state.

2152. Hougas, R. W., Rieman, G. H. and Stokes, G. W.
Resistance to white rust in horseradish seedlings.
Phytopathology 1952 : **42** : 109–10.

Hybrid seedlings from crosses between the Bohemian horseradish, which is resistant to white rust (*Albugo candida*), and the susceptible common horseradish, have exhibited three types of reaction to the fungus in greenhouse inoculation tests: (1) resistance comparable with that of the Bohemian parent; (2) resistance higher than that of the Bohemian type; and (3) a reaction ranging from slightly greater susceptibility than the Bohemian parent to a susceptibility exceeding that of the common horseradish. The plants have not been tested for resistance under field conditions but probably the conditions of the greenhouse trials were more rigorous than those generally encountered in the field.

2153. Mizushima, U. and Murakami, K.
(On the resistance to cold of artificially induced polyploids. II).
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 174–76. [Japanese].

Tetraploid strains of *Eruca sativa* proved more resistant than the corresponding diploids to temperatures descending as low as —3·9° C. The resistance of the tetraploids was correlated with a higher osmotic pressure.

2154. Bunting, E. S. and Blackman, G. E.
The cultivation of annual rapes as oil seed crops.
J. Minist. Agric. 1952 : **58** : 509–13.

The results of recent experiments on the cultivation of summer rape (*Brassica Napus* var. *oleifera* subvar. *annua*) and summer turnip rape (*B. campestris* var. *oleifera* subvar. *annua*) in England and on the performance of varieties of both these crops are discussed.

2155. Székács, J.
Ricinusnemesítés és fajtakísérlet eredményei. **(Results of *Ricinus* breeding and experiments with varieties).**
Agrártudomány, Budapest 1951 : **3** : 136–40.

The history of the breeding of the castor oil plant in Hungary is reviewed, with special emphasis on selection for early ripening. The characteristics of Hungarian varieties as shown in the 1950 trials are tabulated.

2156. Kennerly, A. B.
Four oilseed crops do well in Central Texas area.
Crops and Soils 1951 : **4** : No. 3 : p. 27.

Mention is made of castor bean varieties suited to the area, with particular reference to USDA 74, recently released by the US Department of Agriculture, which can be grown under irrigation; its seed yield exceeds that of older varieties.

2157. Katayama, Y.
(The progeny of female individuals in the castor bean).
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : p. 19. [Japanese].

Data are reported on the inheritance of sex in gynodiecious strains. The results are discussed in the light of the assumption that the female condition is determined by the gene *a*, plants carrying *A* being of the normal monecious type.

2158. Novokreščenov, P. I.
(How the number of leaves on castor-oil plants at harvest time influences the yield of seed and the combine-harvesting of the crop).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 9 : 23–26. [Russian].

Possible decreases in yield resulting from attempts of breeders to develop strains which shed their leaves before maturity, thus facilitating combine harvesting, are discussed with reference to recent observations of a considerable reduction in seed yield of Sanguineus 401 when frost and drought caused leaf shedding.

2159. Székács, J.
A ricinus és változatai. **(*Ricinus* and its varieties).**
Agrártudomány, Budapest 1951 : **3** : 252–56.

A conspectus is given of the botanical varieties composing *R. communis*.

2160. Shimamura, T. and Kobayashi, T.
[Artificial polyploidy in sesame (preliminary report)].
Idengaku Zasshi / Jap. J. Genet. 1948 : **23** : 45–46. [Japanese].

In a comparison between diploid and colchicine-induced tetraploid strains of sesame, it was noted that the tetraploids bore relatively shorter capsules. The tetraploid seeds were larger and fewer per capsule, and fertility was lower. Under suitable conditions of cultivation,

however, the fertility of the tetraploids, improved the number of capsules borne exceeded that of the diploids, and the total yield of seed per plant suffered no reduction.

2161. Zlatkovsky, A.
Pokusné pěstování kunžutu. (**Experiments in cultivating sesame**).
Zpravodaj Ústředí Zeměd. Výzkumníku 1951 : **1** : No. 11–12 : 41–42.

Several Soviet varieties of *Sesamum indicum* are listed, including VNIIMK* 81, DSS 23, Odesskii 539 and Kubanec 55 [Kubanj 55], which are regarded as promising for introduction into Czechoslovakia. The seed of these varieties is white or offwhite and their growth periods are between 94 to 109 days. DSS 23 shows resistance to bacteriosis.

2162. Krishnamurti, T. S.
Improved varieties of oilseeds—sesamum.
Indian Fmg. 1951 : **1** : No. 9 : 22–23.

The characteristics of 13 new varieties of *S. orientale*, developed for use in particular environments by six Indian states, are presented in tabular form. All varieties show superiority over local types in respect of some desirable characteristics: TMV 1, T 5, T 10, T 22, 8, 41, 85 and 128 all give outstanding seed yields; TMV 2 (X 6), TMV 3 (X 38) and 85 have improved oil content; early maturing varieties include NP 3, NP 7 and TMV 2; and NP 29 combines high yields with late maturity.
At the Indian Agricultural Research Institute, taxonomic research concerning the collection of Indian and Burmese specimens is in progress. Crosses between *S. orientale* and a wild insect resistant Indian species, *S. prostratum*, gave rise to sterile hybrids; fertility was induced by colchicine treatment, and subsequent back crosses to *S. orientale* produced progenies combining insect resistance with other desirable characteristics. Several promising selections are undergoing trial before release.

2163. Krishnamurty, T. S.
Improved varieties of oilseeds—linseed.
Indian Fmg. 1951 : **1** : No. 10 : 17–18.

Information is provided on the characteristics of improved strains suitable for different parts of India.

2164. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 11. Oilseeds (excluding cottonseed) and peanuts.**
US Dep. Agric. 1950 : Pp. 97. (Mimeographed).

Information is provided on current research on the breeding and utilization of linseed, tung, groundnut and soya bean and on outstanding results from work on these crops.

2165. Chu, K. H. and Culbertson, J. O.
Studies of inheritance of seed size and other characters in a cross between an Indian and a North American variety of flax.
Agron. J. 1952 : **44** : 26–30.

Dakota and Indian 1193–2, their F_1, F_2 and F_3 progenies and offspring from the F_1 back-crossed to both parents were studied at St. Paul, Minn., to determine whether desirable characters of both varieties could be combined in a single new variety; Indian 1193–2 has superior seed size and oil content, whereas Dakota excels in most characteristics except seed size and oil content. Evidence was obtained for partial dominance of large seed size; a tendency towards phenotypic dominance of tallness; monofactorial control of reaction to both rust and wilt, with resistance dominant; complete independence of inheritance of resistance to wilt and rust with respect to other characteristics studied; significant positive correlations between mean plant height and mean seed size, between oil content and weight per 1000 seeds, and between iodine number and plant height; and significant negative correlations between oil content and iodine number and weight per 1000 seeds.
Some selections from the F_3 proved superior to Dakota in seed size and oil content, superior to Indian 1193–2 in plant height, and at least equal to Dakota in respect of resistance to rust and wilt. The iodine number of a few of these lines was higher than the average of the parent varieties, indicating that the association between low iodine number and large seed size might be overcome by further selection.

2166. Kerr, H. B.
Rust resistance in linseed.
Nature, Lond. 1952 : **169** : p. 159.

So far 15 races of rust (*Melampsora Lini*) occurring in Australia have been identified,

* Vsesojuznyĭ Naučno-Issledovateljskiĭ Institut Masličnyh Kuljtur [USSR Scientific Research Institute of Oil Plants].

using Flor's original set of differential varieties (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1700) and two additional Argentine varieties. Several races have been used in genetical studies; some of the results are briefly compared with those obtained by Flor in the USA. An excised shoot technique has been developed to facilitate testing for resistance. Shoots are excised above the cotyledons, placed in tap water or nutrient solution, and inoculated with uredospores. Unless heavily infected, such shoots soon develop a root system and can then be transplanted or left *in situ* to set seed. This method has several advantages, such as the rapid clonal increase of valuable plants and testing of one plant with several races simultaneously by forcing it to shoot from the base and excising the new shoots.

2167. **New flax has wilt resistance.**
Crops and Soils 1952 : **4** : No. 6 : p. 29.

DeAnza, a new wilt resistant variety for California, has a high oil content and good quality.

2168. Foreløbig meddelelse om forsøg med sorter af oliehør 1949–50. (**Preliminary communication on trials with varieties of linseed 1949-50**).
Tidsskr. Planteavl 1951 : **55** : 175–76.

The performance of the following varieties in trials at the Danish experimental stations of Lyngby, Tystofte, Aarslev and Ødum is recorded in tables showing the yields of seed, straw and crude oil per ha: Trifolium, Dæhnfeldt Elite 6, Aarslev 2984, Klein 18, Øtofte L 59 and Valuta.
Trifolium, with a short stiff stem, gave the highest yield of seed and crude oil, but the lowest yield of straw, while Dæhnfeldt Elite 6 gave about the same yield of crude oil, 8% more straw and 3% less seed.

2169. Minkevič, I. A.
(**A new oil crop *Euphorbia Lathyris* L.**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 9 : 40–43. [Russian].

Following a detailed description of *E. Lathyris*, breeding is reported among other *Euphorbia* species, with particular reference to three varieties, 338 VNIIMK*, 11 VNIIMK and 20 VNIIMK, which show improvements in seed yield, oil content and winter hardiness.

2170. Russell, W. A.
Sunflower breeding in Western Canada.
Canad. Grain J. 1952 : **7** : No. 7 : p. 3.

Breeding aims are briefly considered. They include early maturity, rust resistance and high content of oil. The best source of rust resistance has been found in material from Texas. Since these stocks are closely related to the wild sunflower, an attempt is being made to transfer their rust resistance to cultivated types by crossing and back-crossing, followed by inbreeding and selection. This programme is being accelerated by use of the greenhouse and by growing one generation in South America during the winter months of Canada.

2171. Tarančuk, M. L.
(**The influence of environmental conditions upon sunflower seed and upon improvement in its heritable properties**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 6 : 50–51. [Russian].

Data are presented showing that increases in plant height and seed yield of Černjanka 35 can be induced by appropriate cultural conditions in the preceding generation.

2172. Ustinova, E. I.
(**Instances of apospory in the sunflower**).
Priroda (Nature) 1951 : No. 8 : 43–45. [Russian].

Instances of apospory observed in the sunflower variety Ždanovskiĭ [Ždanov] are described.

2173. Voropaev, A. A. and Štifanova, V. I.
(**An effective method of breeding sunflowers**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 9 : 14–16. [Russian].

Comparisons of the 1000 seed weight and percentage of oil and husk were made between seeds of Pioner Sibiri [Siberian Pioneer], vegetative hybrids between six varieties bred at the USSR Scientific Research Institute of Oil Plants (VNIIMK) and vegetative hybrids between Pioner Sibiri and each of the six varieties; all experimental material was used both as stocks and scions. Oil content was greater in hybrid seed than in the seed of Pioner Sibiri; hybrids having Pioner Sibiri stocks gave highest oil yields combined with low husk percentages.

2174. Cormack, M. W. and Harper, F. R.
Resistance in safflower to root rot and rust in Alberta.
Phytopathology 1952 : **42** : p. 5. (Abst.).
The variety Indian and Nebraska selections N 3, N 5 and N 8 have been classed as highly resistant to *Pythium* root rot. N 3 has also exhibited some resistance to *Puccinia Carthami*.

2175. Thomas, C. A.
The occurrence and pathogenicity of *Phytophthora* species which cause root rot of safflower.
Plant Dis. Reporter 1951 : **35** : 454–55. (Mimeographed).
Isolates from plants infected with root rot in the chief safflower growing regions of the Great Plains and California were identified as *Ph. Drechsleri*. Isolates from plants at Beltsville, Md., consisted of *Ph. cactorum*. Isolates of *Ph. parasitica* from tomato were pathogenic on safflower in greenhouse inoculation tests. Both *Ph. parasitica* and *Ph. Drechsleri* were more virulent than *Ph. cactorum* on the susceptible safflower variety N 9 in greenhouse tests. N 8 was resistant to all isolates used.

2176. Thomas, C. A.
Varietal susceptibility in safflower to *Phytophthora* root rot.
Phytopathology 1952 : **42** : p. 21. (Abst.)
Varieties, selections and introductions have shown marked differences in susceptibility to *Ph. Drechsleri;* N 8, N 5 and N 4 are resistant. A greenhouse method of evaluating resistance, suitable for use in breeding and analysis of inheritance of resistance, has been devised. Plants 1 or 2 weeks old are inoculated with a mycelial suspension at a soil temperature of 25–30° C.

2177. Muhammad Ihsan-ur-Rahman Khan.
Study of somatic chromosomes in some *Acacia* species and hybrids.
Pakistan J. For. 1951 : **1** : 326–41.
Data are presented concerning the comparative morphology of chromosomes and telophase nucleoli of 9 species and 3 hybrids of Australian, African, Asiatic and American origin, examined at the Imperial Forestry Institute, Oxford. Chromosome numbers reported for the first time comprise the Asiatic species *A. modesta*, the African species *A. Senegal* and *A. mellifera*, and both natural and artificial hybrids between the Australian species *A. decurrens* and *A. mollissima;* these all have 26 somatic chromosomes and 2 large + 2 small nucleoli. The natural hybrid *A. Senegal* x *A. mellifera*, with $2n = 39$ and 3 large + 3 small nucleoli, may be a triploid. The Asiatic species *A. arabica*, with $2n = 52$ and 4 pairs of nucleoli of different sizes, appears to be a tetraploid interspecific hybrid; *A. Farnesiana* ($2n = 52$), a tetraploid of American origin, has only 3 pairs of nucleoli, having presumably lost a pair of satellites during evolution. These fertile tetraploids indicate possibilities of improving economic characters by hybridization and induced polyploidy. In Pakistan attempts are being made to synthesize a tetraploid with greater frost hardiness than the local fuel species, *A. arabica*.

2178. Hills, K. L. and Rodwell, C. N.
Variation in the alkaloids of clones of northern *Duboisia myoporoides* R. Br.
Aust. J. Sci. Res. Ser. B 1951 : **4** : 486–99.
Clonal differences in hyoscine content, presumably due to genetic differences, were found. A selection programme should be effective in establishing clones giving high yields of this alkaloid. For hyoscine content, the interaction between clones and seasons for a single locality was greater than that between clones and localities; only two places were however involved in the data. Alkaloids other than hyoscine accounted for 30 to 90% of alkaloids in individual samples.

2179. Špilėnja, S. E.
(Changes occurring in the properties of medicinal plants as a result of vegetative hybridization).
Agrobiologija (Agrobiology) 1951 : No. 6 : 116–21. [Russian].
Morphological and biochemical changes were studied at the Kirov Military and Medical Academy, Leningrad, in grafts and the first seed generations of *Atropa Belladonna* on *Datura ceratocaula, Hyoscyamus niger* on *A. Belladonna, D. inermis* on *D. Stramonium* and *D. Stramonium* on *D. inermis*. Changes in the first seed generation of *D. Stramonium* on *D. inermis* included a higher alkaloid content.

2180. Leszczak, W.
Studia cytologiczno-ekologiczne nad gatunkami tatránskimi rodzaju *Aconitum* Tourn. **(Cytological and ecological studies of species of the genus *Aconitum* Tourn. from the Tatras).**
Acta Soc. Bot. Polon. 1950 : **20** : 647–64.
A study of the chromosome numbers and a preliminary investigation of the morphology of the chromosomes of the species *A. variegatum*

and *A. firmum*, found in various habitats in the Tatra Mountains, were carried out.
Morphological differences in the various biotypes of the species have been found by experiment to be genetically conditioned. The tetraploid species *A. firmum*, very closely related to *A. Napellus*, is not, however, identical with *A. Napellus* as regards nuclear structure, though the chromosome number is the same in each case. This difference in the chromosome morphology supports the view held by Polish systematists, that *A. firmum* is a separate species and not a subspecies in the collective species *A. Napellus*. The nuclear structure of *A. firmum* supports the supposition that it is an allotetraploid.

2181. Rollins, R. C. and Catcheside, D. G. **A note on some techniques of obtaining genetic segregation in apomictic strains of the guayule rubber plant.** Genetics 1951 : **36** : 435–40.

Methods of obtaining genetically diverse progenies from a facultatively apomictic strain of *Parthenium argentatum* ($2n = 72$) have been investigated. Comparatively rarely occurring reduced ♀ gametes may remain unfertilized, giving rise to 36–chromosome plants, referred to as "haploids." In these haploids all functional ♀ gametes are unreduced and the pollen is sterile. The unreduced ♀ gametes, fertilized with reduced ♂ gametes from the original 72–chromosome parent, produce plants ($2n = 72$) showing diversity as a result of genetic segregation occurring in the pollen parent; different haploids also show varied genetic combinations with the same pollen parent. Among hybrids obtained in this way at the Stanford Research Institute, Calif., 45–38–1, 45–39–1 and 45–39–2 have a significantly higher rubber content than either haploid parent or the standard 72–chromosome variety 593; hybrid 45–39–1 has in addition a significantly lower resin content than the others. The degree of apomixis shown by the hybrids does not appear to be less than that which maintains genetic stability in the parent strain.

2182. Feustel, I. C. and Clark, F. E. **Opportunities to grow our own rubber.** Crops in peace and war. Yearb. US Dep. Agric. 1950–51 : 367–74.

The potentialities of guayule, *Taraxacum Kok-saghyz* and other plants for rubber production in the USA are discussed. Hybrids between guayule and *Parthenium Stramonium* show greater growth and vigour than guayule, and although they contain a lower rubber percentage per plant, give a total increase of 40 to 50% in rubber production per acre. Variability in kok saghyz suggests that a higher and more uniform rubber content could be secured by intensive selection and breeding.

2183. Navašin, M. S. and Gerasimova-Navašina, E. N. **(Tetraploidy and a tetraploid kok-saghyz plant).** Agrobiologija (Agrobiology) 1951 : No. 6 : 102–09. [Russian].

The success of the colchicine methods used by the authors to obtain productive tetraploids of *Taraxacum Kok-saghyz* (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 570) is discussed in the light of various theories, including Lepešinskaja's hypothesis that cells may originate from undifferentiated protein. A study of polyploidy based on Mičurinite principles of breeding is advocated.

FRUITS AND NUTS

2184. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 12. Citrus and subtropical fruits.** US Dep. Agric. 1950 : Pp. 90. (Mimeographed).

Information is included on the projects being carried out in connexion with the breeding and selection of citrus and other subtropical fruits. Some of the outstanding results of past work are cited.

2185. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 13. Deciduous fruits and edible tree nuts.** US Dep. Agric. 1950 : Pp. 143. (Mimeographed).

Projects being carried out on the breeding and selection of stone and pome fruits, grapes, small fruits and nut species and on their utilization are briefly described. Some of the outstanding achievements of past work are cited.

2186. Guillaumin, A.
Hybrides de greffe et hybrides sexuels. (**Graft hybrids and sexual hybrids**).
C.R. Acad. Sci. Paris 1945 : **221** : 572–74.

A synopsis is given of hybrid and chimeral trees involving combinations between the pear, quince, hawthorn, medlar, almond and peach.

2187. Baharev, A. N.
(**The work in progress at the I. V. Mičurin Central Genetical Laboratory**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 3 : 20–24. [Russian].

Breeding work with fruits, nuts and vines is reported. Reference is made to cytological research by Žironkin, who claims that the embryonic roots of black currant are formed from cells having no nuclei. It is considered that the above research supports the theories of Lepešinskaja (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1509).

Pome fruits. Recently developed varieties include 54 apples and 9 pears, which have been made standards in the Tambov province. Several productive apples, which are still under trial, are listed. The resistance to cold of the apples Suvorovec [Suvorovite] and Nežnoe [Tender] and to fruit dropping of Pamjatj Ševčenko [Ševčenko Memorial] was improved by the mentor method. Promising material, including some hardy pears, was obtained by interspecific hybridization involving the Siberian crab, cultivated apples, southern pears, quinces and *Sorbus*.

Stone fruits. Breeding apricots for hardiness and resistance to spring frost and scalding injury is in progress. The promising new material includes hybrids between Lučšii Mičurinskii [Best Mičurinsk] and southern varieties, and between Tovarišč [Comrade] and southern varieties. The new *Prunus Cerasus* varieties, Žukovskaja and Krupnoplodnaja [Large-fruited], yielding 7–8 kg. good quality fruit per tree, and a *P. avium* variety, Valerii Čkalov, remarkable for its good fruit flavour, have been developed.

Hazel. Hardy material with large kernels and high oil content has been selected from hybrids between wild hazel trees, Mičurin varieties and southern varieties.

Vines. Over fifty new hardy varieties producing good quality grapes have been bred. They are being multiplied and tested for outdoor cultivation in the central and northern zones of the USSR. Two new varieties have been made standards in the Tambov province.

Melons. Several melons were bred from Kommunarka x Lisevickiĭ and water melons from Stokes x Melitopoljskiĭ 142 [Melitopolj 142]. The material was selected after Mičurinite training for hardiness.

2188. Brooks, R. M. and Olmo, H. P.
1951's new fruit varieties.
Amer. Fruit Gr. 1952 : **72** : No. 1 : 28, 56–58.

Recently released varieties of many kinds of fruits and nuts are listed with brief notes on their origin, chief characteristics and suitability for certain parts of the United States.

2189. Solovjev, E. D.
(**Some observations on overwintering of fruit trees**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 12 : 62–63. [Russian].

Several apple, pear, cherry and plum varieties showed little or no frost injury in the Vladimir province, where winter temperatures between — 20° C and — 40° C were recorded, when the trees were sprayed with water for development of a protective ice layer. The hardy apple varieties included Ijuljskiĭ Petrova [Petrov's July], Arkad Novyĭ [New Arkad], Pobeda [Victory], Novinka [Novelty], Gnome, Selinger, Snežinka [Snow Flake] and Hybrids 26, 27, 28, 33 and 38. All these varieties were developed at the Moscow Fruit Station.

2190. Turov, I. Ja.
(**The development of horticulture in Sahalin**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 3 : p. 76. [Russian].

Reference is made to several apple varieties, including Žučkovskiĭ 1, and to a tomato variety, which have been recently bred in Sahalin.

2191. Potter, J. M. S.
The history of the apple.
J. R. Hort. Soc. 1952 : **77** : 65–75.

The text is given of a paper read to the meeting of the British Association at Edinburgh in 1951 and already referred to in Abst. 1019.

2192. June, R. I.
Origin of red strains of apples in Hawkes Bay.
N.Z. J. Agric. 1951 : **83** : p. 438.

Information is given on the origin of Red Dougherty, Red Jonathan and Red Delicious.

2193. Granhall, I. and Oldén, E. J.
De tetraploida äpplenas utnyttjande i växtförädlingsarbetet. (**The utilization of tetraploid apples in plant breeding**).
Sverig. Pomol. Fören. Årsskr. 1951 : 47–65.

The natural origin and artificial production of tetraploid apples are briefly explained and an account is given of the existing collection of tetraploids at the Balsgård Institute in Sweden (cf. Abst. 653). In addition to Nilsson-Ehle's collection of seedlings from triploid mother varieties, seedlings from open pollinated triploid varieties and from various hybrid combinations of diploid, triploid and tetraploid forms have been found to comprise some tetraploid forms. Finnish, American and Swedish evidence goes to show that the apple Hibernal, brought to USA about 1870–80 from Russia, seems to occur as a triploid and as a tetraploid, without any apparent difference in shape and size of the fruit.
In discussing cold resistance in natural and artificial polyploids with high chromosome numbers, observations at Balsgård are cited, showing that positive transgression, as noted in the progeny of Ribston, does not *per se* determine cold resistance, which depends on the particular combination of parental genes. Self and cross fertility of tetraploids, and crosses between diploids and tetraploids are discussed. In 1945–47, the wild diploid *Malus baccata* was crossed with cultivated tetraploid forms and a tetraploid was discovered in an otherwise triploid progeny. Eight pentaploids were also identified in triploid x tetraploid crosses; the distribution of the chromosome numbers in these crosses suggests that the basic chromosome number for apples is $x = 7$.
By colchicine treatment some mixoploids were obtained including a partial hexaploid from triploid seeds of Laxton's Superb x tetraploid Belle de Boskoop.

2194. Nesterov, Ja. S.
(**The distribution of apple varieties in the orchard**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 1 : 30–32. [Russian].

At the Maĭkop Research Station, the fruit setting and productiveness of several apples were improved by open pollination with several varieties. The seed obtained as a result of selective fertilization was more viable and the hybrids from the seed more vigorous. Varieties which benefit from being planted together are listed. Reference is made to a few varieties which preferred the pollen of a single variety to mixed pollen.

2195. Lisavenko, M. A.
(**What we shall be doing in 1952**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 2 : 3–6. [Russian].

Varietal trials and Mičurinite breeding work with various fruit trees in progress at Gorno-Altaĭsk and Barnaul are outlined.
Reference is made to a promising variety of black currant, Stahanovka [Stahanovite], from Čempion Primorjja [Primorje Champion] x Goliath. It tends to form fasciated stalks and bunches upon which the fruits grow in tiers. It is hoped to fix this character.

2196. Hrubý, K., Macek, J., Pazourková-Hrubešová, Z. and Žáková, J.
Zhodnecení proměnlivosti Panenského jablka v Čechách a na Moravě v roce 1950. (**Variability of the Panenské apple in Bohemia and Moravia in 1950**).
Sbornik Čsl. Akad. Zeměd. 1952 : **25** : 5–12.

The variability in size, shape, keeping properties, resistance to scab and susceptibility to *Carpocapsa pomonella* of 192 Bohemian and Moravian samples of Panenské [Maiden] has been investigated. The best 18 trees have been selected for further study and multiplication.

2197. Ahund-Zade, I. M.
(**The dwarf apple in Azerbaĭdžan**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 2 : 24–25. [Russian].

A collection of local varieties of dwarf apples is being studied at the Institute of Permanent Plantations. It includes some productive forms with large, good quality fruits.

2198. Isaev, S. I.
(**Breeding apple varieties with a dwarf and prostrate habit**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 1 : 14–18. [Russian].

Breeding hardy apples at the Mičurin Scientific Research Institute of Horticulture for cultivation in the Urals and Siberia involved selection of material with a dwarf and prostrate habit and its hybridization and Mičurinite training. The promising material included a hybrid named Stlancevoe [Prostrate] from Antonovka x Johnathan, Sejanec 3–8–18 [Seedling 3–8–18] from Antonovka x Pepin

Šafrannyĭ [Saffron Pippin] and an unnamed hybrid from Pepin Šafrannyĭ x Anis Polosatyĭ [Striped Anis]. The new varieties are hardy, productive and produce good quality medium large fruits. Stlancevoe shows resistance to scab.

2199. McCrory, S. A. and Shay, J. R.
Apple scab resistance survey of South Dakota apple varieties and breeding stocks.
Plant Dis. Reporter 1951 : **35** : 433–34. (Mimeographed).

The varieties and seedlings surveyed included much of the material studied by N. E. Hansen in the breeding programme inaugurated at the South Dakota Agricultural Experiment Station in 1904. Among the apples showing freedom from scab the following are of particular interest: three open-pollinated seedlings of Cathay (*Malus prunifolia* var. *Rinkii*); seedling T 3103 (Nevis x Dolgo); T 3145 (? x Hopa); an open-pollinated seedling of Antonovka Monasir; Elk River (a selection of *M. ioensis*) and certain of its hybrids.

2200. Hough, L. F. and Shay, J. R.
The use of tetraploids in breeding scab-resistant apples.
Phytopathology 1952 : **42** : 11–12. (Abst.).

A giant-fruited 4*n* sport of McIntosh was crossed with three scab resistant clones. The ratios of resistant: susceptible seedlings in the progenies, which presumably consisted of triploids, do not differ significantly from those in progenies from crosses between the same resistant clones and susceptible diploid varieties; it is likely therefore that the dominant genes for scab resistance will be similarly effective in crosses involving other tetraploids. Large-fruited sports of standard varieties are being used in back crosses with advanced generation selections possessing scab resistance and nearly acceptable fruit size and quality, in the hope of securing scab resistant, commercially acceptable seedlings in the next generation without the necessity of growing extremely large populations.

2201. Shay, J. R. and Hough, L. F.
Inheritance of cedar rust resistance in apple.
Phytopathology 1952 : **42** : p. 19. (Abst.).

Preliminary data suggest that (1) reaction to cedar rust is conditioned by a major gene pair, with resistance dominant; (2) McIntosh is homozygous for the major gene pair but its reaction to the disease may also depend upon modifiers; and (3) Delicious, Macoun and Wolf River are heterozygous.

2202. Ushirozawa, K. and Fukushima, S.
(On the time that the flower buds differentiate in the major varieties of apple).
Engeigaku Kai Zasshi / J. Hort. Ass. Jap. 1950 : **19** : 125–33. [Japanese].

Varietal differences are reported in the time of year at which the flower buds of varieties of apple grown in Japan differentiate. The buds of early flowering varieties tend to differentiate early, but corresponding relations did not hold for mid-season and late varieties. The buds of alternate bearers also tended to differentiate early.

2203. Tihonov, N. N.
(Apple varieties for growing in prostrate form).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 1 : 18–23. [Russian].

Ten hardy apple varieties adapted to cultivation in prostrate form in the Krasnojarsk territory are listed. Trials at the Krasnojarsk Horticultural Research Station showed that apparently homogeneous material was variable in its hardiness and yielding capacity when grown in prostrate form. Some hardy and productive clones were selected.

2204. Sapožkov, I. A.
(Changes in fruit trees due to grafting).
Agrobiologija (Agrobiology) 1951 : No. 6 : 125–28. [Russian].

The effects of various vigorous stocks upon pear varieties are noted. Tonkovetka [Thin Branch], normally protogynous, became self fertile when grafted on a red-fruited rowan. The wild Aldanskaja pear produced large fruits of good flavour when grafted on *Amelanchier;* the seedlings showed segregation in respect of morphological characters. Bessemjanka [Seedless] on black-fruited rowan produced fruits resembling those of southern pear varieties, with a Beurré flavour.

2205. Sjubarova, Ė. P.
(Note the ancient pear variety Bere Sluckaja).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 1 : p. 76. [Russian].

An old White Russian variety, Bere Sluckaja [Sluck Beurré], is being multiplied at the White

Russian Horticultural Research Station. It is productive, vigorous, long-lived, and shows resistance to fungous diseases. It is self sterile. The fruits are large, yellow and of good flavour. They reach maturity in September and keep for two months. It is thought that Bere Sluckaja might provide good material for breeding new varieties.

2206. Oldén, E. J.
Växtförädling inom stenfruktsläktet. (**Plant breeding within *Prunus***).
Sverig. Pomol. Fören. Årsskr. 1951 : 66–83.

The history and world distribution of *Prunus* spp. are outlined with additional information on their occurrence in Sweden in particular. The diploid, tetraploid and hexaploid species of plums, the tetraploid species *P. Padus* and the tetraploid and diploid species of the subgenus *Cerasus* are discussed with special reference to their use and potential value for breeding or hybridization purposes.
The stone fruit breeding work at Balsgård aims at crossing sweet and sour cherries to obtain hardier hybrids. To surmount the considerable difficulties of such crosses, a search, ultimately successful, was made for a tetraploid type of sweet cherry (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 487).
In discussing the possible optimum chromosome number, mention is made of a 64-chromosome plum seedling found at Balsgård; it has not yet flowered.

2207. Moyls, A. W.
Fresh and processed apricots as a source of vitamin A.
Sci. Agric. 1951 : **31** : 546–52.

Varieties tested at the Summerland Station, BC, have shown marked differences in vitamin A content of the fresh fruit, ranging from 700 to 4150 mcg. per 100 grm. Canned apricots should retain 66 to 98% and apricot purée approximately 50% of the carotene present in the fresh fruit.

2208. Fedorenko, M. M.
(**Prostrate forms of apricot**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 1 : 23–24. [Russian].

Training apricots for hardiness and a prostrate habit at Žitomir is reported. The material comprised stones of hybrids from open-pollinated Kaščenko varieties from the Botanical Garden of the Ukrainian Academy of Sciences.

2209. Golovačev, D. L.
(**The plum in the Čeljabinsk province**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 1 : 38–40. [Russian].

Breeding plums for hardiness and quality at the Čeljabinsk Horticultural Research Station is reported. The methods involved intervarietal hybridization of *Prunus nigra* and of *P. ussuriensis*, interspecific crosses between *P. nigra* and *P. ussuriensis*, and crosses between these species and either *P. Besseyi* or cherry-plum hybrids. Descriptions are given of Čeljabinskaja Krupnaja [Large Čeljabinsk], Oranževaja [Orange], Čeljabinskaja Zimostoïkaja [Hardy Čeljabinsk], Urožainaja [Productive], Temnomalinovaja [Dark Raspberry], Prozračnaja [Transparent], Čeljabinskaja Pervaja [First Čeljabinsk] and Čeljabinskaja Krasnaja [Red Čeljabinsk], all of which were obtained by open pollination with *P. nigra* as the female parent.

2210. Baranova, A. P.
(**The effects of self pollination and cross pollination upon the growth and development of plum and cherry seedlings**).
Agrobiologija (Agrobiology) 1951 : No. 5 : 111–12. [Russian].

Experiments at the Scientific Research Institute of Horticulture, Mičurinsk, with several varieties of cherry and plum showed that hybrids were more vigorous than selfed material. The growth and development of the hybrid seedlings varied in rate according to the pollinating variety. Cross pollination between trees of the same varieties growing in similar environment did not give an appreciable increase in vigour over selfed material, but seedlings from pollination between trees growing under different conditions showed much greater vigour.
Material obtained by pollination with mixed pollen was taller and healthier than selfed material and hybrids from crosses involving only two varieties.

2211. McVaugh, R.
A revision of the North American black cherries (*Prunus serotina* Ehrh., and relatives).
Brittonia, New York 1951 : **7** : 279–315.

The systematic position of the racemose-fruited cherries, the taxonomy and morphology of the section *Iteocerasus* and the morphology of the inclusive species *P. serotina* are discussed. A key to the subspecies and varieties of *P. serotina* and surveys of the characters and distribution of the subspecies are presented. The phylogeny

of the black cherries is considered with reference to subspecific morphology, the geographical distribution of present-day populations and geological data on ancient forms.

2212. AGATI, G.
Osservazioni sul comportamento ereditario di alcuni caratteri del pesco. (**Observations on the hereditary behaviour of some characteristics of the peach**).
Riv. Ortoflorofrutticolt. Ital., Firenze 1952 : **77** : 3–11.

Italian experiments have confirmed Bailey and French's findings (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 293) regarding the dominance of (1) showy over non-showy flowers in the peach; and (2) of the clingstone over the freestone condition. The existence of a correlation between the type of leaf gland and of indentation of the leaf margin was also confirmed.
A correlation appears to exist between the colour of the leaves and of the pulp, though environmental factors may also intervene (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2173 and Vol. XX, Abst. 517).

2213. CARLONE, R.
Osservazioni su una probabile mutazione gemmaria della varietà di pesco Elberta. (**Observations on a probable bud mutation of the peach variety Elberta**).
Genetica Agraria, Roma 1951 : **3** : Nos. 1–2 : 1–10.

A mutation adversely affecting productivity and also resulting in fewer and less densely placed branches, accompanied by earlier flowering and time of ripening is described. The fruit, which is of the clingstone type, also differs in many other respects from that of the parent tree and the mutant is in general inferior to the typical Elberta peach and is of no interest to Italian growers.

2214. ZINJKOVSKIĬ, V.
(**Lemons in Maĭkop**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 2 : p. 48. [Russian].

Mention is made of promising local lemons obtained by continuous selection.

2215. ZACHARIA [ZAKHARIAH], D. B.
Flowering and fruit setting of Shamouti orange trees.
Palest. J. Bot. 1951 : R. Ser. : **8** : 84–94.

A comparison of pollen viability of four citrus varieties grown in Palestine showed that the average percentage germination of the Shamouti [Shamuti] orange, the most widely grown citrus fruit, was much lower than other varieties; pollen analyses revealed an average of 22·7% small and 37·7% shrivelled grains. Results of emasculation experiments proved that Shamouti fruit does not set without previous pollination; parthenocarpic fruits are sometimes formed after the stimulus of pollination, but normal fertilization usually occurs. In the Shamouti stylar tissues, pollen tubes of the Clementine mandarin penetrated more readily than those from Baladi [Local] and the sour orange; the comparatively slow, and often superficial, penetration of Shamouti pollen tubes indicated partial self incompatibility.

2216. GUZMÁN B., V. L.
Informe del viaje de exploración sobre la chirimoya y otros frutos tropicales. Otras exploraciones sobre la chirimoya. (**Report on an expedition to study the cherimoya and other tropical fruits. Other expeditions for the cherimoya**).
Inf. Cent. Nac. Invest. Exper. Agríc. "La Molina" 1951 : No. 71 : Pp. 25. (Mimeographed).

Wild, semiwild and cultivated plants of cherimoya have been collected from the valleys of the Peruvian Andes, where a great genetic range of material exists. Descriptions are given of eight promising selections found in the Hacienda Ñamas.

2217. MALAVOLTA, E. and SOUBIHE SOBRINHO, J.
Nota prévia sôbre o teor de vitamina C em variedades brasileiras de goiaba (*Psidium guajava*, L.). [**Preliminary note on the vitamin C content in Brazilian varieties of guava (*P. guajava* L.).**]
Rev. Agric., S. Paulo 1951 : **26** : 397–402.

The vitamin C content varied widely in the ripe fruits of the individuals examined, the maximum being 144 mg. per 100 grm. The variations are thought to be genetic in origin.

2218. ROY, R. S.
Plant breeding and alternate bearing of mango (*Mangifera indica* L.).
Sci. and Cult. 1951 : **17** : 122–24.

A breeding programme for the mango is outlined, with the prime objective of eliminating alternate bearing.

2219. **41st Annual Report of the Northern Nut Growers Association 1950** : Pp. 196.

Papers of interest to breeders include the following:—

Chase, S. B. The 1949 Persian walnut contest with notes from Persian walnut growers. (*pp. 27–30*).

Further reference is made to the new Carpathian varieties Hansen and Jacobs (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2128).

Sherman, L. W. The Persian walnut in Pennsylvania and Ohio. (*pp. 34–40*).

The need for regional trials of local seedlings resulting from natural hybridization is discussed.

Wellman, S. Notes on Persian walnuts in England. (*pp. 40–42*).

Selection and propagation methods at East Malling, Kent, are mentioned and popular varieties listed.

Becker, G. Grafted black and Persian walnuts in Michigan. (*pp. 48–51*).

Varieties of *Juglans nigra* which have proved suitable for local conditions and resistant to witches' broom include Thomas, Grundy, Adams, Climax and Homeland.

Lahti, M. Notes on nut growing in New Hampshire. (*pp. 55–56*).

Thomas black walnut, previously reported to withstand winters at Wolfeboro, NH, (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2127), has recently been severely damaged.

Papple, E. E. Filberts, walnuts and chestnuts on the Niagara peninsula. (*pp. 63–65*).

Some of the hybrids obtained from crosses between 14 varieties of *Corylus Avellana* retain their catkins during periods of changeable temperatures. *C. Avellana* was successfully pollinated by *C. rostrata*, a species with hardy ♂ catkins, and seedlings were obtained. Further interspecific crosses are contemplated. A Carpathian walnut with late maturing ♂ catkins, which consequently avoid low winter temperatures, has been isolated.

Crane, H. L. Nut varieties: a round table discussion. (*pp. 66–88*).

The relative merits of different varieties of walnut, pecan, hickory, chestnut, filbert and almond in particular districts are discussed, with emphasis on the need for regional evaluation of different seedlings and clones in order that definite recommendations may be made to growers.

Painter, J. H. Observations on effects of low temperatures in winter 1949–1950 on walnuts and filberts in Oregon and Washington. (*pp. 109–13*).

Reactions of locally grown varieties are described.

Gellatly, J. U. Effects of the winter of 1949–50 on nut trees in British Columbia. (*pp. 113–15*).

Observations reported include data on hybrids obtained from *Juglans Sieboldiana* var. *cordiformis* x *J. cineria*; the following showed marked winter hardiness: Leslie, Dunoka, Fioka, Okanda, Kingsbury, Penoka and Flavo.

Gellatly, J. U. Description of filazel varieties. (*pp. 116–17*).

Details are given of 15 promising hybrids obtained by pollinating the Peace River hazel (*Corylus rostrata*) with numerous varieties of *C. Avellana*.

Gellatly, J. U. Experiments with tree hazels and chestnuts. (*pp. 118–20*).

Mention is made of promising *Castanea mollissima* seedlings grown from seed secured in China. A winter hardy selection bearing large nuts of good quality and flavour has been named Skioka; it also produces excellent timber.

Smith, G. L. Our experience with hickory nut varieties. (*pp. 120–25*).

Varieties showing adaptability to conditions at Millerton, NY, are listed and briefly described.

MacDaniels, L. H. How about the butternut? (*pp. 125–29*).

Varieties which crack easily are recommended for regional trials.

Clarke, W. S. (Jun.). Progress in nut culture at the Pennsylvania State College. (*pp. 132–33*).

Material on trial includes 12 Chinese chestnut seedlings from different sources.

Graves, A. H. Chestnut breeding work: report for 1950. (*pp. 145–48*).

Details are given of numerous crosses carried out at New Haven and Hamden, Conn., between *Castanea crenata* and hybrids derived from crosses between *C. dentata*, *C. mollissima* and *C. crenata*.

In cooperation with Italian experiment stations in Florence and Rome reciprocal crosses were made among American varieties of *C. sativa* and *C. mollissima*, and American types of *C. mollissima* were pollinated by the Italian varieties Pistoiese and Selvatico of *C. sativa* in

order to improve the blight resistance of varieties grown in Italy. Blight resistant hybrids from *C. mollissima* x *C. Seguinii* have been intercrossed before being sent for adaptability trials in Italy.
Other crosses effected included (*C. mollissima* x *C. dentata*) x *C. crenata* and *C. Henryi* x *C. mollissima.*

2220. Isaev, S. S. and Kuznecov, P.
(A large-fruited and thin-shelled form of walnut).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 1 : p. 76. [Russian].
Profsojuznyĭ [Trade Union] has been selected at Kislovodsk for its large thin-shelled nuts.

2221. Nazarkin, V. V.
(A walnut producing nuts in clusters).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 1 : 75–76. [Russian].
Mention is made of an abnormally productive tree found in the Uzbek mountains which produces nuts in clusters of 10, 15 and 20.

2222. Skorodumov, A. S.
(The Ukrainain Scientific Research Institute of Field and Forest Amelioration and of Forestry).
Priroda (Nature) 1951 : No. 8 : 64–66. [Russian].
Mention is made of new varieties of hazels, hardy walnuts and vigorous oaks, showing resistance to drought, which have been recently developed at the institute.

2223. Matsui, S. and Murata, N.
(On chestnut varieties for marrons glacés).
Engeigaku Kai Zasshi / J. Hort. Ass. Jap. 1950 : **19** : 161–67. [Japanese].
The nuts of 20 varieties of *Castanea crenata*, 4 of *C. mollissima* and 1 of *C. crenata* x *C. Bungeana* were compared for suitability for making marrons glacés. Data are given on weight of nuts, ratio of flesh to husk, water content and starch and sugars contents. A better product results from *C. crenata* than from *C. mollissima.*

2224. Instituto Forestal de Investigaciones y Experiencias. Grupo de Experiencias de Repoblaciones. **(The Forest Research and Experimental Station. Group of experiments on re-afforestation).**
Bol. Inform. Minist. Agric., Madrid 1951 : **4** : No. 31 : p. 32.
Selection work already carried out in Spain for forms of chestnut resistant to *Endothia parasitica* has already led to the isolation of very fine specimens of *Castanea crenata, C. koraiensis* and *C. mollissima,* pronounced by visitors to be better than any available in the USA or elsewhere.

2225. Danielsson-Santesson, B.
Fortsatta undersökningar av polyploid hassel. **(Further investigations on polyploid hazels).**
Sverig. Pomol. Fören. Årsskr. 1951 : 84–94.
An account is given of the occurrence and main features of polyploid hazel trees (cf. *Plant Breeding Abstracts,* Vol. XVII, Abst. 857). Details are also given of the development of an eight-year old triploid *Corylus Avellana* seedling that arose spontaneously and has flowered for the first time. Some six-year old tetraploids obtained by colchicine treatment of germinating seeds have not flowered yet.

2226. Vasconcelos, D. de M.
Ensáios de variedades de amendoim. **(Groundnut variety trials).**
Bol. Sec. Agric. Ind. Com. Pernambuco 1951 : **18** : Nos. 1 and 2 : 126–34.
Data on the yield and oil content of 25 groundnut varieties under investigation at the Caruarú Experimental Station are given. The best varieties were Rôxo, Cateto, Tatú [Armadillo], V–13 and V–72.

2227. Turrill, W. B.
Wild and cultivated olives.
Kew Bull. 1951 : No. 3 : 437–42.
This is the text of a paper presented to the meeting of the British Association for the Advancement of Science held at Edinburgh, August 1951. It discusses the classification of cultivated and wild olives, information on the cytology of the genus *Olea,* the classification and geographical distribution of species other than *O. europaea,* and possible modes of origin of the cultivated olive. *O. europaea* var. *Oleaster, O. chrysophylla* and *O. Laperrini* are each examined as the possible ancestor of the cultivated form. The need for taxonomic analysis of the genus on a cytological basis is stressed.

2228. Li, H.-L.
A taxonomic review of the genus *Actinidia.*
J. Arnold Arbor. 1952 : **33** : 1–61.
Descriptions are given of the 36 species recognized in this revision.

2229. Rose, F. J.
Soft fruits.
J. R. Hort. Soc. 1952 : **77** : 12–19.

Reference to old and new varieties of strawberry and other small fruits suitable for growing in England is included.

2230. Cummings, M. B.
Promising bush fruits.
Amer. Fruit Gr. 1951 : **71** : No. 8 : 15, 29.

The performances of many recently released raspberry, blackberry and blueberry varieties are described and compared with some of the older varieties still widely grown in the United States.

2231. Christen, H. R.
Untersuchungen über die Embryologie pseudogamer und sexueller Rubusarten. (**Investigations on the embryology of pseudogamic and sexual *Rubus* species**).
Ber. schweiz. bot. Ges. 1950 : **60** : 153–98.

Existing evidence on reproduction in *Rubus* species is briefly considered with reference to the occurrence of pseudogamous and sexual reproduction. As a contribution to the clarification of the process of apomixis and of the relevant terminology the present detailed study of the structure and development of the archespore and embryo sac was undertaken.
In the course of the work the chromosome numbers of eight species of *Rubus* were determined: *R. caesius*, *R. suberectus*, *R. bifrons*, *R. vestitus* and *R. bregutiensis* proved to be tetraploid ($2n = 28$) while *R. Mercieri* and *R. thyrsoides* had $2n = 21$, and *R. tomentosis* $2n = 14$. The occurrence of apospory and diplospory in the various *Rubus* species is discussed with special reference to the essential difference between these two types of development.
In the author's opinion unreduced egg cells capable of fertilization probably occur in *Rubus*, and crosses may therefore produce three types of hybrid offspring, resulting respectively from unfertilized eggs, the fertilization of haploid eggs, and the fertilization of unreduced eggs.

2232. **New early berry.**
Amer. Fruit Gr. 1951 : **71** : No. 12 : p. 22.

The red raspberry Early Red was developed from a cross between Lloyd George and Cuthbert at the Michigan Agricultural Experiment Station. In addition to earliness, its advantages include a long ripening season and suitability for canning and freezing.

2233. Kobel, F.
Eine eigenartige neue Himbeersorte. (**A remarkable new raspberry variety**).
Schweiz. Z. Obst- u. Weinb. 1952 : **61** : 24–26.

An ever-bearing variety is described in which new shoots are formed throughout the growing period and start bearing flowers as soon as they are formed. It appeared as a seedling of the autumn-fruiting variety Lloyd George and has been named Romy after its breeder.

2234. Simonov, I. N.
(**A new raspberry hybrid**).
Agrobiologija (Agrobiology) 1951 : No. 5 : 142–44. [Russian].

Hybrid 4/7, bred at the Timirjazev Agricultural Academy from Kaliningradskaja [Kaliningrad] x English + Marlborough + Usanka [Moustache], is described. The new raspberry is hardier and has better quality fruit than the standard variety in the Moscow province and is vigorous and productive.

2235. Pitcher, R. S.
Observations on the raspberry cane midge (*Thomasiniana theobaldi* Barnes). I. Biology.
J. Hort. Sci. 1952 : **27** : 71–94.

It has been observed that the amount of natural splitting of the epidermis and outer cortical tissues of the raspberry cane is an important factor in varietal susceptibility to midge attack.

2236. Cadman, C. H.
Studies in *Rubus* virus diseases. II. Three types of vein chlorosis of raspberries.
Ann. Appl. Biol. 1952 : **39** : 61–68.

Three grades of severity in the expression of vein chlorosis on Norfolk Giant are shown to be caused by three closely related virus strains which have been transmitted independently to other varieties grown in Scotland, and to healthy Norfolk Giant indicators, by grafting. Malling Notable, Malling Promise, Malling Seedling M and Malling Landmark developed conspicuous vein chlorosis and dwarfing after infection with the strain producing most severe symptoms on Norfolk Giant.

2237. Cadman, C. H.
Studies in *Rubus* virus diseases. III. A veinbanding disease of raspberries.
Ann. Appl. Biol. 1952 : **39** : 69–77.

The name raspberry veinbanding virus is proposed for a virus isolated from Norfolk

Giant and other varieties in Scotland. It causes chlorosis of the main leaf veins and is considered to be identical with the pathogen causing mosaic 1 disease on Baumforth's Seedling B and Lloyd George. The symptoms produced on certain North American varieties are analogous to those of the North American red raspberry mosaic.

2238. Jakovličeva, N. G.
(The cultivation of gooseberry in the Komi-Permjackiĭ National District).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 3 : p. 75. [Russian].

Seedling selection of Haughton at the Kungurskiĭ Horticultural Farm has given a new hardy productive variety Kudymkarskiĭ Prevoshodnyĭ [Kudymkarskiĭ Excellent]. It shows resistance to mildew and the quality of fruit is good. Other promising material includes Sejanec Finika 1 [Date Seedling 1], selected from Finik Zelenyĭ [Green Date]. Its fruits are as large as those of the initial variety and their quality is better. The variety is hardy and shows resistance to mildew.

2239. Solopov, G. P.
(An outstanding breeder and follower of I. V. Mičurin).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 12 : 31–32. [Russian].

Several apple, pear, gooseberry and strawberry varieties bred by A. V. Petrov at the Moscow Fruit Research Station are listed. The gooseberry varieties Pjatiletka [Five Year Plan] and Mysovskiĭ 17 and 34 [Bay 17 and 34] show resistance to *Sphaerotheca* and mildew.

2240. **Four new berries.**
Amer. Fruit Gr. 1952 : **72** : No. 2 : p. 59.

Information is given on the strawberry Eden, developed at the New York State Experiment Station, and the strawberry Albritton and blueberries Angola and Ivanhoe, introduced by the US Department of Agriculture. Eden is intended primarily for processing. Albritton, a midseason to late variety, gives outstandingly high yields and has good transportability; it appears to be suitable for production in an extensive area in the eastern States. Angola, recommended for North Carolina, is earlier ripening than any other commercial variety in this State. Ivanhoe is noteworthy for its large light blue, good-flavoured fruit; it is recommended for trial as a midseason variety in North Carolina and for limited trial in New England. Both Angola and Ivanhoe are resistant to stem canker.

2241. Darmer, G.
Beiträge zur Blütenbiologie des Sanddorns (*Hippophae rhamnoides* L.). [**On the floral biology of sea buckthorn (*H. rhamnoides* L.)**].
Züchter 1951 : **21** : 363–68.

In the course of this study, the occurrence of male branches and also of female anomalies of the flower was noted in both male and female plants and their incidence was investigated. The occurrence of hermaphrodite flowers, if constant, might be utilized by the breeder in vegetative multiplication by grafting with a view to subsequent hybridization.

2242. Engstedt, G.
Mannevik—en ny jordgubbssort. **(Mannevik. A new variety of strawberry).**
Fruktodlaren 1952 : No. 1 : 15–16.

This strawberry originated from a seedling at Påskallavik in Kalmar, Sweden. The fruits are very fine, being large and well coloured and having a good flavour; they also stand transport well and seem suitable for deep freezing and preserving and as a fresh dessert fruit.

2243. Reid, R. D.
Recent strawberry breeding in Scotland.
World Crops 1952 : **4** : 87–90.

Three aspects of breeding work are reviewed: (1) resistance to red core; (2) combination of valuable commercial qualities with disease resistance; and (3) maintenance of selections in healthy condition and their propagation free from virus or other diseases and pests.

2244. Demaree, J. B. and Marcus, C. P.
Virus diseases of strawberries in the United States, with special reference to distribution, indexing, and insect vectors in the East.
Plant Dis. Reporter 1951 : **35** : 527–37. (Mimeographed).

Plants of a European clone of *Fragaria vesca* have proved to be very satisfactory for indicating the presence of virus diseases in cultivated strawberries in the USA and for differentiating certain virus types and their combinations. Virus-free stocks of several strawberry varieties are now being propagated to replace the present stocks of infected plants.

2245. Baker, R. E. D. and Simmonds, N. W. **Bananas in East Africa. Pt. II. Annotated list of varieties.**
Emp. J. Exp. Agric. 1952 : **20** : 66–76.
Varieties occurring in East Africa are listed alphabetically according to their local names, separate lists being given for the different regions. Each entry includes the following information: meaning of name, if known, and language; usage; main characteristics; and synonymy.

2246. Baker, R. E. D. and Simmonds, N. W. **Banana research—changes in outlook.**
Trop. Agriculture, Trin. 1951 : **28** : 43–45.
So far banana breeding at the Imperial College of Tropical Agriculture, Trinidad, BWI, has aimed at the production of a variety similar to Gros Michel but resistant to Panama disease (*Fusarium oxysporum* var. *cubense*) and leaf spot due to *Mycosphaerella musicola* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2623). Trade acceptance of bananas of the Cavendish group, which are resistant to Panama disease but inferior to Gros Michel in many other respects, may lead to modifications of this programme. Lacatan, a Cavendish type, has the advantage of resistance to Panama disease. IC 2, from a cross between Gros Michel and *Musa acuminata*, is resistant to both diseases, but is inferior to Gros Michel and probably also to Lacatan in bunch size and shape and fruit quality, and it has been commercially unsuccessful. The minimum aims of breeding can therefore be redefined as the development of a banana as disease resistant as IC 2 but with better quality, and no worse in commercial attributes than Lacatan.

2247. Sabatin, E. Ju. **(Bananas in the humid Soviet subtropics).**
Priroda (Nature) 1951 : No. 7 : 67–68. [Russian].
Material available at the Batum Botanical Garden for breeding bananas adapted to outdoor cultivation includes *Musa sapientum*, *M. paradisiaca* and *M. Cavendishii*. Specimens of the latter proved early and hardy. *M. Bosjoo* is also regarded as promising breeding material.

2248. Pirovano, A.
Production de nouvelles variétés de raisins de table. **(Production of new varieties of dessert grapes).**
Progr. Agric. Vitic. 1951 : **68** : 249–53.
The author describes the technique of crossing used by him in breeding dessert grapes in Italy and lists his successes under the following headings: early varieties, varieties with large berries, special flavours or new colours, and finally the seedless types (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1323).

2249. Steingruber, P. and Müllner, L.
Dreissig Jahre Rebenzüchtung (Schluss). [**Thirty years of vine breeding (Conclusion)**].
Mitt. höh. Bundeslehr- u. VersAnst. Wein-, Obst- u. Gartenbau Wien-Klosterneuburg, Bienenkunde Wien-Grinzing 1951 : **2** : 1–3.
Some of the best hybrids were selfed in 1950 and 1081 seedlings were planted out in 1951, of which only 787 survived a severe attack of *Peronospora*. The best hybrids are being multiplied by grafting so as to test their quality for wine making.

2250. Cosmo, I.
Risultati della più recente sperimentazione sugli I.P.D. in Italia. **(Results of the most recent experiments on direct producer hybrids in Italy).**
Annu. Staz. Sper. Viticolt. Enolog., Conegliano 1949 : **13** : No. 19 : Pp. 12.
In continuation of the previous work (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1313), the defects of some of the most widely cultivated direct-producer hybrids are mentioned and certain others that can be recommended are described; best among these were Seibel 5178, Seibel 10.096, Baco 2.16 and Terzi 108.6. None of the hybrids is resistant to *Phylloxera* but their resistance to cryptogamic parasites, though not absolute, is high.

2251. Branas, J.
Productions de nouvelles variétés de raisins de table. Méthodes et résultats. **(Productions of new varieties of dessert grapes. Methods and results).**
Progr. Agric. Vitic. 1951 : **68** : 219–21.
A brief review is given of (1) various species of *Vitis* found in Europe, America and Asia, with indications of their value in grape breeding; and (2) desirable characteristics of vines such as flavour, berry size, earliness, seedlessness and disease resistance. The role of selection and hybridization, including interspecific crossing, in the improvement of grapes is shortly considered, with special reference to French tastes.

2252. Le Cannon Hall et les formes "gigas." (**The Cannon Hall vine and "gigas" forms**).
Progr. Agric. Vitic. 1951 : **68** : 324–25.
The origin of the Cannon Hall tetraploid vine ($2n = 76$) has given rise to much speculation. The writer is of the opinion that the gigas forms, which have very large berries, represent a heteroploid mutant which occurs as a sport on the Muscat d'Alexandrie ($2n = 38$). A similar heteroploid mutation on the same vine has already been recorded from California and from Japan.

2253. Cosmo, I.
La conformazione del fiore quale elemento di fertilità dei vitigni. (**The floral conformation as an element of fertility in vines**).
Annu. Staz. Sper. Viticolt. Enolog., Conegliano 1949 : **13** : No. 14 : Pp. 18.
Consideration is given to various factors which lead to seedlessness in grapes, and to the different sexual types that have been identified in vines. Complete self sterility has never been observed in the perfect hermaphrodites, though the seeds produced vary in germinating capacity; many of the imperfect hermaphrodites are often self sterile, and a list of them is given, as their yield is generally inferior and their cultivation is not recommended. The pollen of some of these varieties, described as physiologically female, is without pores, but it occasionally germinated when used to pollinate perfect hermaphrodites, in some cases giving seeds with up to 70% germination.

2254. Cosmo, I.
Montepulciano, Canaiolo, Sangiovese, Ciliegiuolo. Indagine ampelografica comparativa. (**Montepulciano, Canaiolo, Sangiovese and Ciliegiuolo. A comparative ampelographic study**).
Annu. Staz. Sper. Viticolt. Enolog., Conegliano 1948 : **13** : No. 3 : Pp. 7.
All the varieties named have at various times been said to be synonymous (cf. *Plant Breeding Abstracts* Vol. XVIII, Absts. 1861 and 1862). A special study was therefore made of them and descriptions, together with illustrations, of each variety and certain local races of them are here presented. The conclusion is reached that the vines concerned constitute a group of similar though not identical varieties. They may even be seedlings or sports from the same original parent. They differ, among other things, in such important agricultural features as time of ripening.

2255. Galet, P.
Méthode de description et de classification des espèces, variétés et hybrides de vignes. (**Method of describing and classifying species, varieties and hybrids of vines**).
Progr. Agric. Vitic. 1951 : **68** : 221–29.
The author's classification is based on the following characters: (*a*) pubescence of the bud, of the apex of the branch, and of the adult leaf; and (*b*) ampelometric measurements of the leaf. On the basis of these features, over 1000 clones or varieties have been identified, using an appropriate code and punched cards. A diagnosis, based on the above system is given for nine species of *Vitis*.

2256. Des vignes américaines. (**American vines**).
Progr. Agric. Vitic. 1951 : **68** : 81–84.
The species of *Vitis* found in USA are discussed with special reference to their role in the development of American vines. American varieties introduced into Europe from the nineteenth century onwards are cited. On the parentage of some of these, which are represented in the collection of vines at the École de Montpellier, divergent opinions are held by American and French writers.

2257. Kondratjev, V. F.
(**The vine in the Voronež province**).
Vinodelie Vinogradarstvo SSSR (Winemaking Viticult. USSR) 1951 : No. 12 : p. 48. [Russian].
Varieties adapted to cultivation in the province include several hardy varieties, developed by Potapenko and Lukin, and two local varieties, bred by Poplavskiĭ. The local vines are productive and reach maturity in August. They produce bunches weighing 200 to 250 grm.

2258. Vites, L. S.
(**The standardization of varieties in the northern viticultural districts of Moldavia**).
Vinodelie Vinogradarstvo SSSR (Winemaking Viticult. USSR) 1951 : No. 12 : 26–28. [Russian].
The most promising wine and dessert varieties are listed. The former include a Transcarpathian land variety Fetjaska Belyĭ [White Fetjaska], also known as Leanka, and a hardy European variety Rara Njagra, which show resistance to *Phylloxera*.

2259. Galet, P.
Observations sur la résistance aux maladies des hybrides producteurs cultivés a l'École de Montpellier. (**Observations on the disease resistance of the hybrid producers grown at the College of Montpellier**).
Progr. Agric. Vitic. 1951 : **68** : 178–82; 196–99.

In continuation of the previous report (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 664), a detailed record is given of the resistance to gall-forming phylloxera of 17 American species of vines in the Montpellier collection. Of these, 14 species, represented by 90 varieties, proved resistant and when crossed *inter se* gave resistant progeny, a fact which suggests that in these 14 species a homozygous recessive determines resistance. The resistance or susceptibility of offspring from other interspecific crosses is also listed and Monticola and Cordifolia are shown to give only susceptible offspring. In French direct producer hybrids, resistance is very variable, but a genetic study is impossible owing to the mixed and obscure ancestry of such vines.
The possibility of a relation between resistance to gall-forming phylloxera and the phylloxera attacking the roots is tentatively considered.

2260.
La Stazione Sperimentale di Viticoltura e di Enologia di Conegliano nel triennio 1947–49. (**The Experimental Station for Viticulture and Wine Making at Conegliano in the three-year period 1947-49**).
Annu. Staz. Sper. Viticolt. Enolog., Conegliano 1950 : **13** : Pp. 14.

In reviewing the work of the station in the period concerned it is mentioned that the studies of the direct-producer hybrids have been continued, also those on the varieties of dessert grapes and of rootstocks. Genetical work, which has been almost suspended since the war, is to be taken up again shortly.
A list is given of the papers published by members of the staff of the institute during the period.

2261. Cosmo, I.
Rassegna delle recenti sperimentazioni viticole in Italia. (**Outline of recent researches with vines in Italy**).
Annu. Staz. Sper. Viticolt. Enolog., Conegliano **1949** : **13** : No. 9 : Pp. 9.

The achievements of the last 18–20 years are reviewed. Ampelographic studies have established a number of cases of synonymy and defined the value of the large number of new hybrids of wine, dessert, rootstock and direct-producer vines produced by Italian breeders during the period. Special mention is made of the rootstock Berl. x Rup. 140, which is tolerant of highly calcareous soils, and Pirovano's dessert grapes such as Italia and Delizia di Vaprio, which have found favour in other countries besides Italy.

FORESTRY

2262. Beresford-Peirse, H.
A century of forestry. Forestry in the United Kingdom over the last century.
Nature, Lond. 1952 : **169** : 130–34.

This survey includes a brief discussion of the potentialities of forest tree breeding in Britain.

2263. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 21. Forests and forest products including range and watershed investigations.**
US Dep. Agric. 1950 : Pp. 232. (Mimeographed).

A section listing current projects on forest tree breeding and genetics is included. Some achievements in improvement work are briefly described.

2264. Schröck, O.
Beitrag zur Methodik der Leistungsprüfungen in der Forstpflanzenzüchtung. (Vorläufige Mitteilung). [**A contribution to the technique of performance tests in forest tree breeding. (Preliminary communication)**.]
Züchter 1951 : **21** : 368–70.

The statistical and other difficulties encountered in attempting to apply techniques used in agricultural trials to forest trees are critically discussed and recent suggestions from various sources considered. The author believes that, with proper planning, it should be possible to obtain a picture of the growth curves of individual trees based on regular annual determinations of their relative yields; and from such curves the breeder should be able, after comparatively few years, to judge accurately what their productivity will be when the age of felling is reached. It should be possible to determine the value of the progeny in this way within 8–10 years for pine and 3–5 for poplar.

2265. DE ALMEIDA, J. L. F.
Polispermia em *Quercus Suber* L. (**Polyspermy in *Q. Suber* L.**).
Agron. Lusitana 1951 : **13** : 213–19.
A tree in which up to six of the young ovules develop and form viable seed has been discovered at the Mata Nacional das Mestras, Alcobaça.

2266. POURTET, J.
The poplar—its place in the world.
Unasylva 1951 : **5** : 55–59.
Recent research on *Populus* carried out in Europe and the USA under the coordination of the International Poplar Commission is surveyed. It includes identification and nomenclature, selection and breeding. Future projects are outlined.

2267. ŽURBIN, A. I.
(**Overcoming the incompatibility between the poplar species by means of low temperatures and darkness**).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1950 : **71** : 1113–14. [Russian].
Hybrids between *Populus pyramidalis* and *P. lasiocarpa* and between *P. canadensis* and *P. laurifolia* have been obtained at the Forestry Institute of the USSR Academy of Sciences.

2268. **The American poplar. Its importance for Europe.** Organisation for European Economic Co-operation, Paris, 1951 : Pp. 53.
An account of the visit of a mission comprising members of the Timber Committee of OEEC, to study poplar cultivation in the United States, includes a chapter on poplar breeding. Much of the research to develop quick growing hybrids for pulp has limited application in Europe where poplars are used as structural timber, but methods of testing sample plots of hybrid selections for adaptability to varied soils and climatic conditions deserve trial in Europe. Promising hybrids selected at Frye include the following: *Populus deltoides* x *P. caudina, P. angulata* x *P. Volga, P. monilifera* x *P. caudina, P. deltoides* x *P. incrassata, P. candicans* x *P. berolinensis* and *P. nigra* var. *betulifolia* x *P. trichocarpa*. Canker resistance has been obtained among progenies of *P. Maximowiczii* x *P. berolinensis* and *P. charkowiensis* x *P. nigra* var. *plantierensis*; hybrids of *P. Maximowiczii* with *P. berolinensis* and *P. trichocarpa* possess greater frost resistance than *P. Maximowiczii* itself.
Hybrid vigour was observed in progenies of *P. alba* x *P. tremuloides* and *P. tremula* x *P. tremuloides*, where American species had been crossed with European introductions. Mention is made of the influence of photoperiod on strains introduced to foreign latitudes, with reference to the work being undertaken at the Arnold Arboretum, Mass.

2269. JOHNSSON, H.
Avkommeprövning av björk—preliminära resultat från unga försöksplanteringar. (**Progeny testing of birch. Preliminary results from young experimental plantations**).
Svensk PappTidn. 1951 : Nos. 11 and 12.
Medd. Fören. Växtföräd. Skogsträd 1951 : No. 55 : Pp. 30.
Birch trials have been in progress in Sweden since 1942 and some results have already been recorded (cf. *Plant Breeding Abstracts* Vol. XIII, Abst. 330). The present report discusses growth increments with special reference to height, diameter and volume in 15 different 3–9 year old progeny tests covering 1942–48.
Numerous tables summarize the data on differences between species; interspecific hybrids; progenies of *Betula verrucosa* and *B. pubescens*; and crosses within these two species.
The latitude from which seed was obtained in Sweden was found to affect the growth rate; but variation in northern families of birches is considerable and inferior endemic strains in southern Sweden could be replaced by selected central Swedish families of superior quality.
B. papyrifera grows very rapidly but is inferior in its trunk form and heavy branches. This defect in form can be counteracted by crossing with *B. pubescens* or *B. verrucosa*; the resulting hybrid grows at a good rate. *B. verrucosa* x *B. japonica* combines good growth with satisfactory form.
Recommendations are made regarding the technique of progeny testing of forest trees.

2270. MELVILLE, R.
The elms of the Dumortier herbarium.
Bull. Jard. Bot. Brux. 1951 : **21** : 347–51.
Ulmus reticulata is reduced to synonymy with *U. cornubiensis* and *U. reticulata* var. *sepearia* to synonymy with *U. Plotii*.

2271. PILIPENKO, F. S.
(**Training hardy strains of *Eucalyptus***).
Agrobiologija (Agrobiology) 1951 : No. 6 : 80–91. [Russian].
Further observations on *Eucalyptus* are reported (cf. *Plant Breeding Abstracts* Vol. XXI, Abst.

2170). Over 50 new hybrids have been bred at Suhumi and Soči.
The experiments showed that *Eucalyptus* acquired a higher degree of hardiness when reproduced for several generations from seed under the conditions of the Soviet subtropics. The best results in breeding *Eucalyptus* for hardiness were obtained with crosses between hardy species and with crosses of the resulting hybrids with other hardy species or adapted forms.

2272. Gustafsson, Å.
Berättelse över verksamheten vid statens skogsforskningsinstitut under år 1950. (Report on the work of the National Forestry Research Institute during 1950).
Medd. Skogsförsöksanst. Stockh. 1951 : **40** : No. 8 : 1–18.
The programme of hybridization and inbreeding of pine by the Genetics Division was continued, use being made, in the crosses, of superior and inferior trees from the same stand (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2156). Inbreeding of spruce and interspecific crosses of spruce and of pine were also carried out. Provenance studies of pine from various countries proceeded on the same lines as before.

2273. Zobel, B.
The natural hybrid between Coulter and Jeffrey pines.
Evolution, Lancaster, Pa. 1951 : **5** : 405–13.
Pinus Coulteri and *P. Jeffreyi* and hybrids between these two species were studied in Californian populations with regard to the chief characteristics of the cone, seed, foliage and oleoresins. The parent species are relatively constant, with little evidence of distinct local races. Introgression occurs but only to a limited extent, mainly in *P. Coulteri*.

2274. Zobel, B.
Oleoresin composition as a determinant of pine hybridity.
Bot. Gaz. 1951 : **113** : 221–27.
Oleoresin characters have been found to be valuable in detecting natural hybrids between *Pinus Coulteri* and *P. Jeffreyi*. The following properties of the volatile oil portion are closely correlated: specific gravity, index of refraction, optical rotation and percentage of material insoluble in concentrated sulphuric acid. Determination of the latter provides a simple method of estimating the degree of hybridity; only 1 c.c. of oil is required for the test. The oleoresin characters are very constant throughout the parental species; any variation in the hybrids is therefore highly significant. Use of oleoresin characters has made possible the detection of unsuspected hybrids.

2275. van der Schulenburg, A. F.
Questions of provenance with relation to pulpwood.
Pap. Puu 1950 : **32** : 387–92.
In this discussion of conifer races, mention is made of a strain of spruce from Niederlausitz which shoots late and so avoids late spring frosts. *Pinus Murrayana* has proved useful in Finland, but it is necessary that the strains used should be of homoclimatic provenance.

2276. Harrison, S. G.
Edible pine kernels.
Kew Bull. 1951 : No. **3** : 371–76.
The value of *Pinus* spp. as sources of edible kernels is surveyed. Planting for kernel production only is not likely to prove economically profitable. The more important nut pines at the present time, *P. Pinea*, *P. Cembra*, *P. cembroides* and *P. Gerardiana*, also produce useful timber. The possibility of developing improved nut strains by selection, interspecific hybridization or polyploidy is mentioned.

2277. **Progress of research activities in South Africa.**
Unasylva 1951 : **5** : 64–67.
It is mentioned that controlled pollination and collection of seed from élites are being carried out to improve the form and growth rate of the chief coniferous species. The possibilities of producing valuable hybrids are also being examined. Spiral grain in *Pinus longifolia* is a heritable character.

2278. Minckler, L. S.
Southern pines from different geographic sources show different responses to low temperatures.
J. For. 1951 : **49** : 915–16.
In replicated field plots at the Union State Tree Nursery, Jonesboro, Ill., 3-year-old seedlings of *Pinus Taeda* from seed grown in South Carolina were killed by November frosts of 32–24° F while those from seed grown in Maryland and Arkansas showed only temporary browning of the youngest needles. Seedlings of *P. echinata* originating in southern states showed light to moderate injury whereas those from more northern areas proved frost resistant.
P. echinata and *P. Taeda* derived from seed sources in Virginia and North Carolina produced

interspecific hybrids having a high degree of winter hardiness.

VEGETABLES

2279. **Report on research, service and marketing educational work in the United States Department of Agriculture. Part II. Chapter 14. Vegetables.**
US Dep. Agric. 1950 : Pp. 128. (Mimeographed).

Information is provided on current projects on the breeding and utilization of onion, cucurbits, tomato and other vegetables. Outstanding achievements from past work are also briefly surveyed and additional research required is indicated.

2280. Institut pour l'Encouragement de la Recherche scientifique dans l'Industrie et l'Agriculture I.R.S.I.A. Rapport Annuel. Exercice 1950. (**The Institute for the Promotion of Scientific Research in Industry and Agriculture IRSIA Annual Report. Financial year 1950**).
Pp. 161.

Some points of interest to plant breeders are mentioned in this report:—

Medicinal plants. The Colonial Centre for the Documentation and Coordination of Chemical Research is to organize studies on medicinal plants collected in 1947–48 in the Belgian Congo, and botanical determinations and chemical studies of samples of *Strophanthus, Strychnos, Erythrina* (including three new species) and *Tephrosia* are to be undertaken.

Carrot. Dutch and French varieties will be studied with reference to root shape.

Spinach. Research similar to that planned for peas and beans, excepting the *Fusarium* investigation, will be undertaken on new varieties of spinach imported from Holland.

Celery. A search will be made for varieties immune to a mosaic disease which has appeared in the Louvain and Malines district.

Peas and beans. Trials of peas will be held in various districts to discover varieties giving large numbers of extra fine quality peas and varieties yielding larger peas.

The seed from hybrids produced in 1949 to obtain lines with several pods at the same node will be planted and harvested separately to study segregation.

A comparative trial of early main crop and late varieties will be carried out as well as selection of *Fusarium* resistant varieties.

With the exception of the last named investigation, similar work will be undertaken on kidney beans.

2281. Svensson, V.
Morotsförädling. (**Carrot breeding**).
Weibulls Allehanda 1945 : **5** : No. **3** : 15–17.

Methods and aims in carrot breeding are briefly mentioned with special reference to work in progress at Weibullsholm, Sweden. Improvement is sought in regard to growth rate in forcing carrots of the Amsterdam type; keeping properties, yield, carotene content and quality in winter carrots; colour in early carrots for growing in the open; and carotene distribution in the core and the tissue surrounding it (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2193 and 2194).

2282. Svensson, V.
Karotinhalten i morötter och dess beroende av olika faktorer. (**Carotene content in carrots and its dependence on various factors**).
Weibulls Ill. Årsb. 1951 : **46** : 30–34.

Of interest to carrot breeders is the fact that red, as opposed to yellow, coloration and small core have been found to be correlated with high carotene content (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2194 and 2195).

2283. Kuznecov, P. E.
(**The Chinese radish in the Primorje territory**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. **1** : p. 75. [Russian].

The most extensively cultivated varieties are Loba Krasnaja [Red Chinese Radish], which produces roundish red roots with white flesh of mild flavour, Loba Belaja Zelenogolovaja [Green headed White Chinese Radish], which has roundish greenish-white roots with a sharper flavour than Loba Krasnaja, and Loba Belaja Dlinnaja [White Long Chinese Radish], which develops cylindrical roots with white skin and flesh. The roots of the last named variety will not keep.

2284. Diehl, R., Dupuis, G. and Tsvetoukhine, V.
Recherches sur le topinambour. (**Investigations on the artichoke**).
Ann. Inst. Nat. Rech. Agron. 1951 : **1** : Ser. B : 336–54.

The results of a study in France of the shape and arrangement of tubers, yield, earliness and content of dry matter and hydrolysable glycosides are recorded. The productivity of nine

improved types tested in a three-year trial is recorded.

2285. Stoll, K. and Klinkowski, M.
Zur Frühdiagnose der Austriebsneigung lagernder Küchenzwiebeln (*Allium cepa*).
[**On early diagnosis of the tendency to sprout of stored onions (*A. Cepa*)**].
Züchter 1951 : **21** : 256–75.

The value was tested of (1) the cytoplasmic properties of the tissue of the outer scales, (2) the specific gravity, (3) the evolution of carbon dioxide, and (4) loss of water by weight, as indicators of the tendency to early sprouting. Determinations of specific gravity, alone or in combination with either the evolution of carbon dioxide or the loss of water during storage, afford some basis for selection for late sprouting, but the composition of the initial population limits the degree of success. The cytoplasmic characteristics bore no relation to the time or extent of sprouting.

2286. Peregudt, M. F.
(**The efficacy of intervarietal crosses of onion**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. **3** : 61–62. [Russian].

At the Crimean Vegetable Research Station the productiveness of a local variety Čebotarskiĭ, remarkable for good flavour and keeping properties, and the keeping quality of the productive variety Jaltinskiĭ [Yalta] were improved by cross pollination. The greatest increases in the yield and size of bulb of Čebotarskiĭ were obtained as a result of pollination with Express, Samarkandskiĭ [Samarkand], Prizovoĭ [Prize] and Jaltinskiĭ. The following hybrids of Jaltinskiĭ had the best keeping properties: Jaltinskiĭ x Kaba 42, Jaltinskiĭ x Johnson, and Jaltinskiĭ x Southern White Globe. The hybrids yielded 2 to 25% less than Jaltinskiĭ.

2287. Warid, W. A. and Tims, E. C.
Studies on the inheritance of resistance to downy mildew in onion incited by *Peronospora destructor*.
Phytopathology 1952 : **42** : p. 22. (Abst.).

Data have been obtained suggesting that the resistance of the onion Calred to downy mildew depends upon one or two duplicate recessive genes, tentatively designated S_1 and S_2.

2288. Christiansen, E. and Henriksen, A.
Forsøg med sorter og stammer af porre 1945–48. (**Trials with varieties and strains of leeks, 1945-48**).
Tidsskr. Planteavl 1951 : **55** : 144–62.

The history of the leek in many countries is reviewed and the performance of 20 strains of 7 different varieties raised in Denmark and tested at the Danish research stations at Virum, Blangstedgaard, Hornum and Spangsbjerg is recorded with notes on yields and the size and quality of the plant.
More detailed descriptions of the successful certified strains are appended.

2289. Hanna, G. C.
Asparagus plant breeding.
Calif. Agric. 1952 : **6** : p. 6.

A description is given of a vigorous 24 years' old ♂ plant, D–37, selected at Davis, Calif., from the variety Mary Washington. Crosses have been effected to combine the vigorous fern growth and prolific spear-producing capacity of D–37 with the large spear diameter shown by two ♀ offspring recently derived from this strain.

2290. Kahn, R. P., Anderson, H. W. and Hepler, P. R.
Asparagus rust investigations in Illinois.
Phytopathology 1952 : **42** : p. 13. (Abst.).

The so-called rust resistant strains of asparagus from Washington State were susceptible in the greenhouse and field in Illinois. None of the varieties and selections tested proved resistant; differences in susceptibility were however noted.

2291. North, C.
Vegetative propagation of cabbage and allied vegetables.
Emp. J. Exp. Agric. 1952 : **20** : 43–46.

Ways in which vegetative reproduction can prove useful in breeding and strain maintenance are discussed. Three methods of propagation by cuttings are described, with particular reference to work being carried out at the National Institute of Agricultural Botany, Cambridge, England.

2292. Mizushima, U. and Murakami, K.
(**On the resistance to cold of artificially induced polyploids. I.**).
Nippon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Jap.) 1950 : **19** : Nos. 1/2 : 171–73. [Japanese].

Tetraploid strains of *Brassica chinensis* proved more resistant to a temperature of –2·3° C than the corresponding diploids. The osmotic pressure of the cell sap of the tetraploids was also higher.

2293. Pound, G. S.
Relation of air temperature and virus concentration to mosaic resistance in cabbage.
Phytopathology 1952 : **42** : 83–88.

Experiments were carried out on the relation of temperature and virus concentration to the

reaction of cabbage lines inoculated with a mixture of viruses A and B. The results reported refer to the A component since only the local lesions produced by this strain were assayed. Lines highly resistant to mosaic expressed resistance only at 24° C or below in artificial inoculation tests. At 28° C infected plants showed severe symptoms. Close correlation was obtained between severity of symptoms and virus concentration; the relation of air temperature to expression of resistance was in fact equivalent to the relation of air temperature to the activity of the virus in the host. These results explain slight fluctuations in symptoms expressed by resistant selections. It has been noted that the temperature at which mosaic resistance, a polygenically conditioned character, becomes nonfunctional is very close to that at which the polygenic resistance to *Fusarium* yellows also becomes nonfunctional.

2294. Pound, G. S. and Walker, J. C.
Mosaic resistance in cabbage.
Phytopathology 1951 : **41** : 1083–90.

Lines highly resistant to mosaic were obtained by selection of the *Fusarium* yellows resistant varieties Wisconsin All Seasons, Wisconsin Ballhead and Wisconsin Hollander. Segregates resistant to the mottle phase of mosaic were secured from crosses between mottle resistant and susceptible lines. Resistance to mottling was incompletely dominant and appeared to be inherited quantitatively by means of relatively few gene pairs. Resistance to the chlorotic phase also showed incomplete dominance; limited data suggested that inheritance to chlorosis was also quantitative. Resistance to mottling was independent of resistance to chlorosis since mottle resistant but chlorosis susceptible lines were obtained.

2295. Axelsson, F.
Comet Weibulls/51, eine neue Blumenkohlsorte für das Treibhaus. (**Comet Weibulls/51. A new variety of cauliflower for the greenhouse**).
Agri Hortique Genetica, Landskrona 1951 : **9** : 139–53.

Comet, put on the Swedish market in 1950, consists of the progeny of pair crossing carried out between material derived by inbreeding and individual selection from Erfurter Zwerg [Erfurt Dwarf], a Danish variety bred by Thomas Madsen, Copenhagen.
Comet is an exceptionally early cauliflower with a slender erect habit and not very vigorous as regards growth, which is however very uniform so that practically all the plants head at the same time.

2296. Pound, G. S. and Pen-Ching Cheo.
Studies on resistance to cucumber virus 1 in spinach.
Phytopathology 1952 : **42** : p. 16. (Abst.).

Data from the cross between the resistant variety Virginia Savoy and susceptible Nobel showed that resistance to the above virus depends upon a single dominant gene. The effects of temperature and other environmental factors upon reaction to the disease are discussed.

2297. Munger, H. M. and Newhall, A. G.
Emerson Pascal . . . a blight-resistant celery.
Fm. Res. 1952 : **18** : No. 1 : p. 11.

The new variety Emerson Pascal resembles Summer Pascal in several characters but is highly resistant to *Cercospora* and *Septoria* blights. The first cross in its ancestry consisted of one between a blight resistant selection of the Danish type of celery, used for soup, and Golden Self Blanching. A blight resistant selection from this hybrid was crossed with Cornell 19 to obtain better eating quality; finally Emerson Pascal was selected from a cross between a selection from this hybrid and Cornell 6.

2298. Jackson, A. A.
Witloof chicory.
J. R. Hort. Soc. 1952 : **77** : 47–54.

In this account of production of Witloof chicory on the continent, the importance of using good strains is briefly stressed.

2299. Petrov, I. A.
Vytváříme nové sorty cukrových a vodních melounů pro chladné oblasti ČSR. (**Develop new varieties of melons and water melons for the cold provinces of Czechoslovakia**).
Zpravodaj Ústředí Zeměd. Výzkumníků 1951 : **1** : No. 11–12 : 47–48.

Mičurinite methods of breeding melons and water melons for hardiness, earliness, productiveness and quality in Czechoslovakia are advocated. These include vegetative hybridization between melon and gourd and between water melon and gourd.

2300. Ahmad Shamsul and Saha, B.
Chromosome number of *Gymnopetalum cochinchinensis* Kurz.
Curr. Sci. 1951 : **20** : 332–33.

The chromosome number of *G. cochinchinensis* is reported to be $n = 11$. It is pointed out that other genera of the Cucurbitaceae, viz. *Citrullus*, *Lagenaria*, *Momordica* and *Trichosanthes*, also have a haploid number of 11.

2301. PARRIS, G. K.
Downy mildew resistant strains of watermelon from the Dominican Republic, West Indies.
Plant Dis. Reporter 1951 : **35** : 399–401. (Mimeographed).

Native water melon strains from the Dominican Republic have shown a useful degree of resistance to downy mildew (*Pseudoperonospora cubensis*) at the Florida Agricultural Experiment Station; they are susceptible to anthracnose (*Colletotrichum lagenarium*), gummy stem blight (*Mycosphaerella Melonis*) and *Fusarium* wilt. Crosses have been made between 12 inbred strains of these water melons and lines resistant to *Fusarium* wilt and anthracnose. Information is given on the fruit shape, rind colour, rind markings and seed colour of the 12 strains.

2302. **Oklahoma develops hybrid watermelon.**
Seed World 1951 : **69** : No. 8 : p. 33.

It is mentioned that the anthracnose resistant F_1 hybrid between Black Diamond and an anthracnose resistant variety shows promise as a means of preventing heavy crop failures.

2303. NITSCH, J. P., KURTZ, E. B. (JUN.), LIVERMAN, J. L. and WENT, F. W.
The development of sex expression in cucurbit flowers.
Amer. J. Bot. 1952 : **39** : 32–43.

At the Earhart Plant Research Laboratory, Pasadena, Calif., day length and temperature were found to modify the duration of each of the successive phases determining the nature of the flowers which develop from primordia of the Acorn squash (*Cucurbita Pepo*). Under uniform conditions of light and temperature the following sequence of flowers occurs along the stem starting from the basal leaf axil: incompletely developed ♂, normal ♂, normal ♀, inhibited ♀, giant ♀ and parthenocarpic ♀. This sequence is maintained regardless of climatic factors; high temperatures and long photoperiods prolong the ♂ phase, whereas low temperatures and short days effectively limit the duration of each phase so that ♀ flowers and, ultimately, parthenocarpic fruits are formed after only a small number of nodes have developed.
Similar results were obtained using the variety Boston Pickling (*Cucumis sativus*) and the small gherkin (*C. Anguria*).

2304. ETCHELLS, J. L., JONES, I. D. and BELL, T. A.
Advances in cucumber pickling.
Crops in Peace and War. Yearb. US Dep. Agric. 1950–51 : 229–36.

Reference to breeding cucumbers for pickling in the USA is included. Several white-spined varieties recently developed have certain advantages over black-spined cucumbers, such as greater yield, better transportability, and less spoilage when temporarily stored as fresh material.

2305. EPPS, W. M. and BARNES, W. C.
The increased susceptibility of the Palmetto cucumber to downy mildew in South Carolina.
Plant Dis. Reporter 1952 : **36** : 14–15. (Mimeographed).

Prior to 1950, Palmetto was highly resistant to downy mildew (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1381). Recently however the variety has shown increased susceptibility, presumably because a new race of the fungus has arisen.

2306. KORNEEV, A. P.
(A tomato marvel).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 1 : 74–75. [Russian].

The Korneevskiĭ [Korneev] tomato, developed in the Penza province, is briefly described. It is remarkable for its large fruits, some of which weigh 1200 grm. The fruits are dark pink, fleshy and of good flavour when fresh or bottled. The skin is easily detachable from the flesh. The variety has moderate soil and temperature requirements and reaches maturity in mid-August.

2307. LAMPRECHT, H. and SVENSSON, V.
Ny drivtomat med högt odlingsvärde. (**A new tomato for forcing that is well worth growing**).
Weibulls Allehanda 1944 : **4** : No. **3** : 2–5.

This tomato, Scania, bred at Weibullsholm, has proved superior in yield of fruits of the first and second pickings and in earliness and quality.

2308. **American tomato yearbook 1951** : Pp. 36.

The yearbook includes the following: statistics of tomato production in the USA; information on breeding the variety Rutgers and on tomato utilization; and a list of recent references on breeding, varietal trials and other topics.

2309. JENKINS, J. A. and MACKINNEY, G.
Inheritance of carotenoid differences in yellow-tangerine hybrids of the tomato.
Genetics 1951 : **36** : p. 556. (Abst.).

At the University of California, tangerine (*RRtt*) and yellow (*rrTT*) mutants, differing from the

red tomato (*RRTT*) in respect of lycopene content, produced red F_1 hybrids (*RrTt*) with carotenoid content like that of homozygous red individuals. Segregation in the F_2 showed a red: yellow: tangerine ratio of 12 : 3 : 4. Most of the tangerine hybrids resembled the tangerine parent, but the few double recessives (*rrtt*) were visibly indistinguishable from the rest and contained appreciably more lycopene than the yellow parent.

2310. Castronovo, A.
El Instituto de Fitotecnia presenta tres nuevas variedades de tomate. (**The Plant Breeding Institute presents three new tomato varieties**).
Inform. Invest. Agríc. (IDIA), B. Aires 1951 : **4** : No. 44 : 7–10.

After examining between 250 and 300 thousand plants of the tomatoes grown locally in various regions of Argentina, the best 600 were selected for progeny tests, on the basis of which 40 were selected. From the progenies of these, only 8 families were retained and submitted to yield tests. Three of the families proved markedly superior to the standard in total yield and gave 47–48% of their yield in the first two weeks. These selections were also more uniform in quality and have been named Magnif Justo [Just Magnif], Magnif Libre [Free Magnif], and Magnif Soberano [Sovereign Magnif], respectively. The first gives the highest yields, the last the largest fruits.

2311. Menezes, O. B. de and Nunes, W. de O.
Hibridação artificial do tomateiro (*Lycopersicum esculentum* Mill.). [**Artificial hybridization of the tomato (*L. esculentum* Mill.)**]
Rev. Agric., S. Paulo 1951 : **26** : 383–90.

Indications are given of the technique of artificial crossing for the tomato.

2312. Manunta, C.
Ulteriori indagini fisiogenetiche su alcuni geni influenzanti la pigmentazione della polpa nel genere *Lycopersicum*: in varie specie, razze e loro incroci. (**Further physiogenetic investigations on some genes affecting pigmentation of the flesh in the genus *Lycopersicum*, in various species, varieties and their hybrids**).
Genetica Agraria, Roma 1951 : **3** : Nos. 1–2 : 93–108.

Biochemical examinations of the F_1 and F_2 of *L. pimpinellifolium* x *L. esculentum* and *L. hirsutum* x *L. esculentum* suggest that β-carotene synthesis is due to a gene *B* rather than to pleiotropic action of *R* (cf. Abst. 2311).
Some F_2 plants from *L. esculentum* x *L. hirsutum* show a high content of β-carotene, an important finding since it opens up the possibility of breeding new varieties for a very high provitamin A content.
Crosses involving tangerine varieties showed that both the yellow Palla Oro and the red varieties carried the dominant factors *TT*.

2313. Manunta, C.
Sul modo d'agire, biochimicamente, dei geni dai quali dipendo il colore dei frutti in razze coltivate di *Lycopersicum esculentum* Mill. e in specie selvatiche del genere. (**On the biochemical mode of action of the genes controlling colour of the fruits of cultivated varieties of *L. esculentum* Mill. and in wild species of the genus**).
Genetica Agraria, Roma 1951 : **3** : Nos. 1–2 : 11–38.

Continuing her previous work (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 717) on the qualitative and quantitative distribution of carotinoid pigments in mature and immature fruits of *L. esculentum*, the author found that the allelomorphs *Yy* for yellow skin and colourless skin and *Rr* for red flesh and yellow flesh segregate independently and the double recessive *ry* may appear in the F_2 from the cross Cuor di Bue [Ox Heart] (*Ry*) x Palla Oro [Golden Ball] (*rY*). The presence of *R* leads to a marked increase in β-carotene. It is not clear whether β-carotene synthesis is due to a gene closely linked with *R* or to a pleiotropic effect of *R*, whose main effect is lycopene formation. Karrer has shown that in unripe tomatoes lycopene synthesis is inhibited above 30° C but β-carotene formation is not.
In tangerine varieties of tomato, which are homozygous for a gene *t*, Zechmeister (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 707) found that prolycopene synthesis is not inhibited at 30° C. Hence it seems that the biochemical basis of synthesis of lycopene and prolycopene is different.

2314. Zerpa, D. M. de
Un caso de incompatibilidad de cruzamiento en tomate. (**A case of cross incompatibility in tomato**).
Agron. Trop. Venezuela 1951 : **1**: 157–63.

Crosses of *Lycopersicon esculentum* x *L. hirsutum* gave a certain number of fruits when the variety Panamerican was used as seed parent. The reciprocal cross gave no seed at all, nor did

the back cross of the F_1 on to *L. hirsutum*. Panamerica set seed when pollinated with the F_1 and the F_1 set seed with *L. esculentum*. The compatibility in these crosses seems to be correlated with the respective lengths of the style, which is short in *L. esculentum*, long and slender in *L. hirsutum* and intermediate in the F_1.

2315. Rick, C. M.
Hybrids between *Lycopersicon esculentum* Mill. and *Solanum lycopersicoides* Dun.
Proc. Nat. Acad. Sci., Wash. 1951 : **37** : 741–44.

F_1 hybrids between the above two species, each of which has $2n = 24$, were secured with the aid of embryo culture. The hybrids were vegetatively more vigorous than either parent and in most morphological characters resembled *S. lycopersicoides* more closely than the tomato. Pollen and ovule fertility were extremely low, but back crosses in which *L. esculentum* formed the female parent yielded occasional ovules and preliminary embryo cultures resulted in one seedling. The F_1 hybrid had a chromosome number of $2n = 24$; a mean of 14·8 chromosomes showed pairing, mostly as bivalents. In colchicine-induced amphidiploids nearly all the chromosomes paired, chiefly as bivalents, and pollen fertility was 67%. The possible significance of these results to tomato breeding and genetics and with respect to the relationship between the genera *Solanum* and *Lycopersicon* is briefly discussed.

2316. Bacsa, P.
Vegetatív hibridizálási kísérletek eredményei Bánkúton. (**The results of experiments on vegetative hybridization at Bánkut**).
Agrártudomány, Budapest 1951 : **3** : 53–55.

A higher dry matter content and fewer stomata per unit area are reported after vegetative hybridization of the tomato. Colour changes in wheat are claimed after embryo transplantation.

2317. Forlani, R.
Innesti fra solanacee. (**Grafts between Solanaceae**).
Genetica Agraria, Roma 1951 : **3** : Nos. 1–2 : 89–92.

Avakjan and Jastreb's work on tomato grafts has not been confirmed by the results obtained by the author from (1) 12 grafts of four varieties of tomatoes differing in the colour and shape of their fruits and (2) a graft of a yellow on a red fruited pepper. In each case the scion produced fruits and foliage similar to those of the mother plant from which it came and no interaction between scion and stock was observed; seed from scion and stock gave seedlings corresponding exactly to the variety from which the scion and stock had been taken; and no variegated fruits were formed. The young scions used, however, were about 8–10 cm. long; recent work in Russia has involved smaller scions, about 5 cm. long.

2318. Felföldy, L.
Előkísérletek paradicsomoltványokon. (**Preliminary experiments in tomato grafting**).
Agrártudomány, Budapest 1950 : **2** : 89–95.

An English account of this work is summarized in Abst. 1525.

2319. Poljakova, T. F.
(**Instances of chromosome fragmentation as a result of grafting**).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1950 : **73** : 175–78. [Russian].

The vegetative tomato hybrid Budenovka [Budennyĭ] x Želtaja Gruša [Yellow Pear] on *Nicotiana alata* produced in the second seed generation several plants showing changes in leaf shape. Cytological analyses of the roots of these plants showed that some of them had 25 and others 26 instead of the normal 24 chromosomes. It is considered that the additional chromosomes arose through fragmentation as a result of grafting.

2320. Limberk, J.
Pokusy s roubováním nedřevnatých rostlin na rostliny dřevnaté. II. Roubování rajských jablíček a papriky na kustovnici. (**Experiments on grafting woody plants on nonwoody plants. II. Grafting tomatoes and red pepper on *Lycium barbatum***).
Sborn. Českosl. Akad. Zeměd. 1951 : **24** : 335–40.

The present study deals with vegetative grafts of *Lycopersicon* on *Lycium barbatum*, *Lycopersicon* on *Capsicum annuum*, *C. annuum* on *L. barbatum*, *L. barbatum* on *Lycopersicon* and *Helianthus annuus* on *H. tuberosus*.
The grafts between red pepper and *L. barbatum* and between tomato and *L. barbatum* produced two fruits, each containing some viable seed. *H. annuus* on *H. tuberosus* also produced some

seed. Notes on the hardiness of the grafted material and on transmission of mosaic from a *L. barbatum* scion to a tomato stock are included.

2321. Powers, L.
Gene analysis by the partitioning method when interactions of genes are involved.
Bot. Gaz. 1951 : **113** : 1–23.
The genetics of locule number was studied in the tomato varieties Danmark, Johannisfeuer, the F_1 hybrid, and the selfed and back cross F_2 generations. Environmental variability was found to follow a logarithmic scale. The genetical basis of variation is attributed to two gene pairs: *AAbb* (Danmark) and *aaBB* (Johannisfeuer). Dominance in the case of both genes was dependent on the other genes present. Interallelic interactions and effects of these on dominance were also noted.

2322. Winstead, N. N.
Evaluation of resistance in tomato to *Pseudomonas solanacearum* by artificial inoculation methods.
Phytopathology 1952 : **42** : p. 23. (Abst.).
When resistant plants were inoculated by pouring a bacterial suspension over severed roots, resistance increased as the age of the plants increased. All the resistant lines tested showed a greater degree of resistance in the roots than in the stems. Incidence of disease in the resistant lines decreased as the concentration of inoculum decreased. Observations on the behaviour of susceptible lines in various experiments are also noted. The causal bacteria were isolated from most plants of resistant lines, although no external symptoms of the disease could be detected.

2323. Ferguson, W., Lyall, L. H. and Racicot, H. N.
Tomato breeding for resistance to *Phytophthora infestans* (Mont.) de By. I. Method of inoculation and preliminary results.
Sci. Agric. 1952 : **32** : 57–66.
The standard procedure used to evaluate resistance to late blight at the Central Experimental Farm, Ottawa, is described. The results of seven preliminary tests of *Lycopersicon esculentum* varieties and selections, *L. peruvianum* ssp. *dentatum*, *L. hirsutum*, *Solanum* spp. and interspecific hybrids of *Lycopersicon* are summarized. Strains obtained from the Philippines showed outstanding resistance, the most promising being Philippine. This strain belongs to *L. esculentum* and is a representative of the Ilocano type. Apart from its late blight resistance, however, it has little horticultural value.

2324. Hoadley, A. D.
Inherited resistance to *Colletotrichum phomoides* in tomato.
Phytopathology 1952 : **42** : p. 113. (Abst.).
A high degree of resistance to anthracnose caused by *C. phomoides* is shown by some lines of the cherry tomato (*Lycopersicon esculentum* var. *cerasiforme*). Anthracnose resistant, large-fruited selections have been developed by crossing the cherry tomato and susceptible variety Rutgers, and by subsequent back-crossing. The inheritance of anthracnose resistance appears to be complex.

2325. **Report on the work of the West of Scotland Agricultural College for the year ending 30th September, 1951** : Pp. 56.
It is mentioned that Canadian tomato hybrids and hybrids developed at the college were tested for resistance to *Botrytis* stem rot and *Cladosporium* leaf mould. Several selections with a high degree of resistance to both diseases have been made; these have been crossed with susceptible commercial varieties of good quality.

2326. Caldwell, J.
Some effects of a plant virus on nuclear division.
Ann. Appl. Biol. 1952 : **39** : 98–102.
Observations on the effects of aspermy virus infection on ovules and pollen grains of tomato show that the presence of the virus in microsporocytes or megasporocytes interferes with the normal stages of meiosis. Frequently the chromosomes aggregate at pachytene and precocious nucleolar disintegration occurs; in some instances cells containing a variable number of chromosomes are formed but these abort before maturity. Occasionally a few normal pollen grains or embryo sacs were noted; since it is recognized that the virus concentration varies throughout the plant it is assumed that these normal gametes arose from uninfected cells.

2327. **Report on research, service, and marketing educational work in the United States Department of Agriculture. Part II. Chapter 7. Dry beans and peas.**
US Dep. Agric. 1950 : Pp. 20. (Mimeographed).
Current projects on pea and bean breeding and utilization are listed. Some achievements of

past work are surveyed. It is stated that the value of interspecific bean crosses in breeding for disease resistance requires exploration.

2328. Reisch, W.
Variabilitätsstudien an *Vicia faba* L. **(Variability studies with *V. faba* L.).**
Z. Acker- u. Pflanzenbau 1952 : **94** : 281–306.

The morphological differences between various German varieties of broad bean are discussed. Amongst the characteristics investigated were the conditions for fertilization, height of plant, number of pods set, height of insertion of the lowest pod and set of seed. Small seeded forms generally exhibit a greater height of plants and greater number of internodes and pods.
The superior development of pods and seed in the lower inflorescences showed that, in contrast to soya beans and peas, the broad bean should be bred for types in which the lowest inflorescence is as low on the stem as possible. Owing to the enhanced yields observed in plants with two or more stems, breeding for this character is desirable.
Varietal differences in the contents of crude protein and fat were insignificant. The more important correlations between individual characteristics in the broad bean plant are enumerated.

2329. Åvall, H.
Två nya värdefulla bönsorter. **(Two new valuable varieties of beans).**
Lantmannen 1952 : **36** : p. 115.

In the national horticultural trials in Sweden during 1950 and 1951 at Alnarp and Nyckelby, the brown beans Ahle/51, a selection from a land variety bred by Å. Åkerman at Svalöf, and Beka/51, a Dutch variety introduced into Sweden a few years ago, have been graded as first class.
Ahle/51 gave high yields in all trials and had a 1000 seed weight of 485 grm. on the average, while in size of seeds it approximates to the variety Spässerud, formerly widely grown; the colour of the seeds recalls that of Stella.
Beka/51, which has light yellowish brown seeds, is also high yielding and has a longer growing period than Ahle/51 or Stella W: s/41, which latter it resembles in several respects. Beka/51 gave the highest total yield of all the first class varieties but had a higher percentage of inferior seeds than Stella or Ahle/51. The quality of both Ahle/51 and Beka/51 was good.

2330. Hoffman, J. C. and Kanapaux, M. S.
Wade, a new all purpose snap bean.
Seed World 1952 : **70** : No. 4 : 38–39, 46.

Further information is given on the above variety (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2069). It was developed from a cross between a selection of Burpee's Tender Pod and a selection from an unknown outcross of US No. 5 Refugee.

2331. Singh, S. B.
Moong type 1 to solve food problem in the U.P.
Indian Fmg. 1951 : **1** : No. 9 : 24–25.

An early maturing variety of mung (*Phaseolus Mungo*), referred to as T 1, has been developed by the Uttar Pradesh Department of Agriculture. The beans mature in 65 days and the haulms are recommended as green manure for subsequent crops on the same plot.

2332. **Gold Medal snap bean introduced.**
Sth Seedsman 1952 : **15** : No. 2 : p. 62.

The release of Wade Bush (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2069) is reported; it has proved well adapted to climate conditions in all bean growing areas of the US.

2333. Bateman, A. J.
Variation within French bean varieties.
Ann. Appl. Biol. 1952 : **39** : 129–38.

Variability within each of 11 strains of *Phaseolus vulgaris* examined at the John Innes Horticultural Institution, England, was measured in respect of seed weight in the F_1 and F_2. Only one strain each of Continuity and The Prince appeared to be homogeneous, while a strain of Canadian Wonder and one of Unrivalled showed extreme heterogeneity. A comparison between 5 strains of Canadian Wonder suggests that each strain contains at least 2 or 3 distinct pure lines out of the minimum estimate of 4 lines shared between them; the possibility that a large number of genotypes showing continuous variation is represented cannot, however, be ignored.
Indications that varieties differ in respect of the frequency of outcrossing were obtained by analyses of progenies from 14 varieties crossed with two black-seeded beans; the presence of the gene for black seed, which is dominant, was easily detected by the characteristic purple mottling on the cotyledons of F_1 seedlings.
The origin of intravarietal variation is discussed.

2334. Lamprecht, H.
Ein *Phaseolus coccineus*-Typ mit schekkigen Blüten und seine Vererbung. (**A *Phaseolus coccineus* type with mottled flowers and its inheritance**).
Agri Hortique Genetica, Landskrona 1951 : **9** : 135–38.

A description is given of a line of *Ph. coccineus* with mottled flowers. The pattern is conditioned by a single recessive gene *dis* (*colores dispares*). In the same line the pronounced groove and marked breadth of the pods also behaved as recessive characters.

2335. Frets, G. P.
The heredity of the dimensions and the weight of the seeds of *Phaseolus vulgaris*.
Genetica 1951 : **25** : 338–56.

Data concerning the influence of the maternal F_1 seed coat on the range of variation in bean dimensions of the F_2 seed generation are summarized in the form of characterograms (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1405). The dominance of large dimensions over small is expressed in characterograms representing average measurements. Characterograms for individual beans indicate the independent inheritance of genes determining each dimension. Variation coefficients for the F_3 and F_4 generations are also discussed.

2336. Cass Smith, W. P., Harvey, H. L. and Goss, O. M.
"Westralia"—a new rust resistant pole bean.
J. Agric. W. Aust. 1951 : **28** : 317–24.

Westralia was developed from a natural cross between the rust susceptible Golden Harvest and a rust resistant strain of brown-seeded Kentucky Wonder in Western Australia. It combines the valuable characters of both parents, and is white-seeded and suitable as fresh beans and for canning.

2337. Afanasiev, M. M. and Morris, H. E.
Bean virus 2 (yellow) on Great Northern bean in Montana.
Phytopathology 1952 : **42** : 101–04

Some varieties and strains of the Great Northern type of bean are highly resistant to bean virus 1 but are attacked by a virus which has been identified as bean virus 2. Only two selections, Montana 1 and 43–45, have consistently shown a high degree of resistance to virus 2.

2338. Thomas, H. R., Jorgensen, H. and Wester, R. E.
Resistance to downy mildew in lima bean, and its inheritance.
Phytopathology 1952 : **42** : 43–45.

Resistance to downy mildew (*Phytophthora Phaseoli*) was found in four lines: PEI 164155 from India; PEI 163580 from Guatemala; 8747, a selection from the southeastern United States; and 4931, line L–37 from the University of California. Resistance was conditioned by a single dominant gene. In the field, very little sporulation was observed on the resistant lines; in the greenhouse young plants of resistant lines sometimes developed necrosis when inoculated, with some sporulation on the necrotic tissue.

2339. Kennerly, A. B.
Extra Early Blackeye. The new higher, earlier yielding version of an old favorite.
Sth. Seedsman 1952 : **15** : No. 1 : 23, 64.

The cowpea Extra Early Blackeye has matured earlier than other varieties tested at the Texas Agricultural Experiment Station and has usually produced the highest yields. It has a desirable bush type of growth, is suitable for canning and freezing and gives a high machine shellout percentage. The variety is also useful for soil improvement and hay production.

2340. Saunders, A. R.
Complementary lethal genes in the cowpea.
S. Afr. J. Sci. 1952 : **48** : 195–97.

Seedlings from the cross Portuguese White x Light Red began to show reduced growth and wilting when about 2 weeks old; six weeks after planting none survived. This lethal condition depends upon two complementary genes, L_1 and L_2, carried by Portuguese White and Light Red, respectively. A second lethal condition, occurring at a much earlier stage, was discovered in the F_1 of the cross Light Red x NI 31; it is suggested that this depends upon two further complementary genes, L_3, contributed by Light Red, and L_4 carried by NI 31. Four other varieties have been found to possess L_2.

2341. Coffey, L. C.
Cream of creams.
Sth. Seedsman 1952 : **15** : No. 3 : p. 35.

Cream 40, a new bush cowpea recently released by the Texas Agricultural Experiment Station, competes favourably in respect of earliness and

yield with the best Blackeye and Purple Hull varieties. Developed from a cross between Extra Early Blackeye and a long-podded mid-season variety of the cream-seeded type, Cream 40 bears desirable cream-coloured peas which are suitable for freezing or canning. Most of the pods are borne well above the foliage and mature simultaneously; thus the variety is readily machine-harvested.

2342. Humphrey, L. M.
Effects of neutron irradiation on soybeans.
Soybean Digest 1951 : **12** : No. 2 : 11–12.
The genetic effects of neutron irradiation of the seed are being studied at the Robert L. Dortch Seed Farms, Scott, Ark., with a view to obtaining useful characters for varietal improvement. A number of mutant characters have been induced but it is not yet known whether any will be of practical value.

2343. Brumpt, É.
Essais de culture de 23 variétés de soja à la station universitaire de Richelieu (Indre-et-Loire). [**Cultivation trials of 23 soya bean varieties at the University Research Station of Richelieu (Indre-et-Loire).**].
C. R. Acad. Sci. Paris 1946 : **222** : 408–10.
Data are given on yield, earliness, and fat and protein contents of the varieties studied.

2344. Mahmud, I. and Kramer, H. H.
Segregation for yield, height, and maturity following a soybean cross.
Agron. J. 1951 : **43** : 605–09.
The F_3 and F_4 generations from the cross Lincoln x Mandarin have been studied at Purdue University, Lafayette, Ind., in respect of plant height, maturity date and yielding capacity. An attempt was made to avoid genetic shift due to natural selection by bulking equal quantities of seed from each selected F_3 plant to provide the bulk F_4 population; F_3 and F_4 lines were tested in the same year to control possible interactions between generation and environment. Data on the relationship of F_3 lines to a bulked F_4 sample from each line and to individual F_4 lines from selected F_3 plants indicate that F_3 lines provide reliable estimates of potential yielding ability of F_4 segregants. Calculated mean squares and variance components for succeeding generations up to F_9 are included; using the variance component for generation x family as a measure of environmental variability, slight evidence of dominance deviation and epistasis was found for yield but none for height or maturity.

2345. Černobrivenko, S. I.
(A new and valuable variety of soya bean, Dneprovskaja 1).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 9 : 36–39. [Russian)].
Dneprovskaja 1 [Dnepr 1], recently developed for the Ukraine, produces large yellow seeds containing 20% oil and 40% protein. It is better suited to combine harvesting than the widely grown Staroukrainskaja [Old Ukrainian] which it outyields by 1·3 c. per ha.; it matures earlier and withstands drought better than either Harbinskaja 111 [Harbin 111] or Harjkovskaja 149 [Harjkov 149].

2346. Bartley, B. G. D.
Heritage and nonheritable relationships of agronomic characters in successive generations of soybean crosses.
Iowa St. Coll. J. Sci. 1952 : **26** : p. 167. (Abst.).
Results of analyses of segregation for maturity date, plant height, seed yield and degree of lodging in the F_1, F_2 and F_3 of Hawkeye x Ottawa Mandarin, Lincoln x Ottawa Mandarin and Lincoln x Hawkeye are discussed. Positive and significant correlations were observed between maturity date, height and yield among F_2 and F_3 plants, and F_3 and F_4 progenies; these characters were positively associated with lodging in the F_3 and F_4 generations. Genetic correlations between maturity date, height and yield in the F_2, F_3 and F_4 were calculated from regressions of progeny means on parental estimates; considerable interrelationship indicates that the three characteristics may be determined by a gene complex.
It is suggested that effective selection for maturity and height can be achieved in the F_2, but selection for yielding ability should be delayed until the F_4 when differences among lines may be more accurately measured.

2347. Atkins, J. G. (Jun.) and Lewis, W. D.
***Rhizoctonia* aerial blight of soybeans in Louisiana.**
Phytopathology 1952 : **42** : p. 1. (Abst.).
Varietal differences in susceptibility to the above disease were observed, Dortchsoy 31 and Ogden being considerably more susceptible than other varieties.

2348. Wellensiek, S. J.
***Pisum* crosses IX: the new flower colour "cerise".**
Genetica 1951 : **25** : 525–29.

Further analyses of successive generations derived from a cross between two white-flowered lines at the Wageningen Plant Breeding Institute suggest the presence of yet another gene *Ce*, which modifies the action of *Cr* in determining the production of purple flowers. In the recessive state the new gene is responsible for either the original white flowers, *ce ce cr cr*, or the recently discovered cerise flowers, *ce ce Cr Cr*, depending on the condition of other genes; in each case the influence of four basic genes, *A*, *Aw*, *B* and *Ar*, on anthocyanin development is assumed.
Segregation ratios show that *Ce* and *Cr* are linked with a cross-over value of 26·5%. Since linkage between *Cr* and the gene determining green or yellow pod colour, *Gp*, has already been established, it appears that *Ce*, *Cr* and *Gp* belong to the same linkage group.

2349. Lamprecht, H.
Genanalytische Studien zur Artberechtigung von *Pisum humile* Boiss. et Noë. (**Genetic analyses bearing on the status of *P. humile* Boiss. et Noë as a species**).
Agri Hortique Genetica, Landskrona 1951 : **9** : 107–34.

Having described the botanical characteristics of *P. humile* and defined his conception of the essential criteria of a species, the author records test crosses made between *P. humile* and lines of *P. sativum* differing in chromosome structure. The fertility of the offspring and the segregation of the specific characters, and of the corresponding genes in the crosses made suggest that *P. humile* is not a separate species and should be regarded only as a race or variety of *P. sativum*.

2350. Hartmair, V. and Leitenberger, L.
Untersuchungen über den Saccharosegehalt von Pflückerbsen und dessen Abhängigkeit von äusseren und inneren Faktoren. (**Investigations on the sucrose content of cooking peas and its dependence on external and internal factors**).
Züchter 1951 : **21** : 292–301.

Significant differences in mean sucrose contents were observed between the four varieties Vorbote, Laxton's Progress, Duplex and Delikatess; the time at which the maximum sucrose content was reached was also characteristic of each variety.

2351. Madsen, R. C.
Growing peas for canning and quick-freezing.
Agric. Gaz. N.S.W. 1951 : **62** : 643–46, 672.

Varieties suitable for the processing industry in New South Wales are described.

2352. Schneider, A.
Untersuchungen über die Eignung von Erbsensorten für Zwecke der Nasskonservierung. II. Qualitative Unterschiede von Schal- und Markerbsenstärke und ihre Einflüsse auf die Aufgussflüssigkeit der Nasskonserven. (**Investigations on the suitability of varieties of peas for purposes of wet preserving. II. Qualitative differences in the starch of shelling peas and of marrow fat peas and their effects upon the liquid added in wet preserving**).
Züchter 1951 : **21** : 275–81.

In continuation of the previous report bearing on varietal differences in starch content and its conversion into sugar during storage (cf. Abst. 853), the present account deals with the morphological and structural differences in the starch granules of shelling and marrow fat peas, and with their relation to the underlying chemical and metabolic differences that occur in the two groups of peas respectively.

2353. deZeeuw, D. J. and Andersen, A. L.
Response of pea varieties to dry and slurry methods of seed treatment.
Phytopathology 1952 : **42** : 52–56.

Varietal differences in response to fungicidal seed treatments are reported.

2354. Sortsforsøg med Foderærter og Kogeærter 1949–51. (**Variety trials with fodder peas and cooking peas 1949-51**).
Tidsskr. Frøavl. 1952 : **20** : 371–73.

A preliminary report is given of the performance of the following varieties of Danish and Swedish peas tested at five different centres in Denmark: the fodder peas Brio, Parvus, Weibull's Nr. 047, Glaenøært Trifolium and Atomært, and the cooking peas Øtofte Flavoært, Kloster and Kronært Nr. 101. Their characteristics and origin are given with records of their yields, green forage and content of dry matter and crude and pure protein.

2355. Snell, R. S.
New Jersey's first sweet corn hybrid.
Hort. News, N.J. 1952 : **33** : 2475, 2485–86.

A hybrid at present known as No. 101 is ready for large scale commercial trial in New Jersey. In recent tests it has given a 31% higher yield of marketable ears than Carmelcross. The hybrid is resistant to bacterial wilt and smut. Its parents are the inbreds Purdue 39 and NJ 143y.

2356. **Release Golden Harvest sweet corn.**
Seed World 1952 : **70** : No. 4 : p. 50.

Golden Harvest (P 39–5 x P 51 B), to be released by the Indiana Agricultural Experiment Station, is similar to Golden Cross Bantam in season, quality and yielding ability. It should be especially desirable for canning and freezing since its silks are white.

2357. Stevenson, F. V., Wolf, E. A. and Bregger, T.
A preliminary report on the testing of sweet corn for resistance to *Helminthosporium turcicum* Pass. at the Everglades Experiment Station in 1950-51.
Plant Dis. Reporter 1951 : **35** : p. 488. (Mimeographed).

Work on the development of single crosses with resistance to the above disease was initiated at the Everglades Station, Fla., in 1950. Fifty-two inbreds exhibited some resistance individually or in hybrid combinations in tests during 1951; three were highly resistant. It is noted that observations in Indiana in 1951 agree with data on resistance obtained at the Everglades Station.

2358. Baxter, J. W.
Physiologic specialization in *Puccinia menthae*.
Phytopathology 1952 : **42** : p. 2. (Abst.).

At least 10 races occur, differentiated by their ability to infect species in eight genera of Labiatae. The race infecting *Mentha spicata*, *M. arvensis* and *M. rotundifolia* has been designated race 1; *M. piperita*, *M. arvensis* and *M. longifolia* are infected by race 2.

2359. Svensson, V.
Persilja Viris Weibulls. Ny sort från Weibullsholms Växtförädlingsanstalt.
(The Weibull parsley variety Viris. A new variety from Weibullsholm Plant Breeding Institute).
Weibulls Allehanda 1949 : **9** : 15–16.

The above variety, which is dark green and rather curly, is specially recommended for forcing, as it is able to resist fungous diseases so often promoted by the rich soil used. Its superiority to Extra mosskrusig [Extra Moss Curly] and Non plus ultra in yield and quality is shown in a table. It was as hardy as other varieties when raised during the winter in the open or in frames.

BOOK REVIEWS

Buros, O. K.
Statistical Methodology Reviews 1941-1950.
John Wiley & Sons, Inc., New York and Chapman & Hall, Ltd., London 1951 : 56s. : Pp. x + 457.

The editor of these reviews instituted the practice, while review editor of the Journal of the American Statistical Association, of collecting together and publishing in the journal all the known reviews of a particular book or research work. These were reprinted before the war as year books. The present quite extensive publication covers the period 1941–50, and confines itself to reviews of books on statistical methodology. The result should be of real value to the present-day statistician wanting to know where to go to for authoritative information on any topic, and also to the future historian of statistical science. A valuable part of the book is the series of indexes, by periodical, by publisher, by title, by name and by subject. J. W.

Villars, D. S.
Statistical design and analysis of experiments for development research.
Wm. C. Brown Company, Dubuque, Iowa 1951 : Pp. xvii + 455 : tables : graphs.

This is a book containing the standard statistical methods, amplified along the lines of the study of experimental design and analysis, with a view to being of use in particular to those carrying out experiments in the industrial field. The methods are, of course, general, and since the author learnt them from English statisticians who were working with him on rubber in the field and laboratory, it is likely that other workers in the agricultural field will equally be able to find something useful to their needs in

this book. An early chapter describes the use of the calculating machine. The standard statistical distributions and tests follow, culminating in the analysis of variance and covariance, the principles of experimental design, and the main designs available. Subsequent chapters are on the whole more specialized, dealing with the control chart, sequential analysis, comparison of machines and efficiency studies. The book concludes with a number of miscellaneous points by way of refinement of procedure, and by a substantial final chapter on the fundamental mathematical theory which underlies the structure of the book generally. All the necessary tables, design lists and so on, are included in an appendix. J. W.

LAWRENCE, W. J. C.
Practical plant breeding.
George Allen & Unwin Ltd., London 1951 : 3rd ed. : 8s. 6d. : Pp. 166 : 34 figs.

The latest edition of this practical guide for enterprising gardeners who decide to breed plants for themselves contains one more chapter than the second edition (cf. *Plant Breeding Abstracts*, Vol. X, p. 64). This extra chapter is concerned with specialized breeding techniques recommended for several popular flowers, including roses and chrysanthemums, and for sweet corn; suggestions are also made for using hybrid vigour in onion, sweet corn and tomato. A revision appears in the remarks on interspecific sterility, page 97; less space is now devoted to the occurrence of incompatibility between pollen tubes and style. Amendments to the suggested techniques for colchicine application are also included in the same chapter on page 103.

CHOUARD, P.
Éléments de génétique et d'amélioration des plantes. Tome 1: les mécanismes de l'hérédité élémentaire ou factorielle. (**Elements of genetics and plant breeding. Vol. 1: The mechanisms of elementary or factorial inheritance**).
Centre de Documentation Universitaire, Paris 1951 : 450 fr. + postage : Pp. iv + 113 : figs : tables : (Mimeographed).

As compared with other European countries and the USA, France has been slow in developing the science of crop and animal improvement by breeding and genetics, and it has long been obvious that a good French text book, providing instruction for French readers in these two branches of science was lacking. To eliminate this gap is the object of the work under review, of which one volume has now been published; and it should take its place between the popular booklet and the highly specialized monograph. The work, which is based on a series of lectures delivered by Professor Chouard at the Conservatoire National des Arts et des Métiers, Paris, should provide French biologists, agriculturists, horticulturists and others with an orderly account, in their language, of advances that have been made throughout the world in the systematic improvement of economic plants and animals by the application of selection and genetical laws. Three volumes are planned. The first covers (*a*) the cytological basis of heredity, namely, mitosis, meiosis and fertilization; (*b*) the fundamental laws of heredity as represented by Mendelian crossing and segregation, hybridization of one or more characters, gene interaction, linkage and gene mapping; (*c*) phenogenetics; and (*d*) sexuality in relation to inheritance.

The second volume, which will appear shortly will deal with the more complex phenomena of heredity and its creative and evolutionary aspects; and the third volume will be devoted to the genetic history of the main wild and cultivated plants.

Judging by Volume I, the author is fully competent to realize this plan, which calls for a knowledge, both wide and detailed, of the subject. The terminology used is up-to-date—which is not always so in French genetical and cytological papers—and the synonyms and English equivalents provided should be useful for French readers wishing to consult the English or American literature of their subject. It is very regrettable that funds were not available to ensure that a work of such value should be suitably printed and bound to give it the appearance of value and permanence which it undoubtedly deserves. Nevertheless, readers need not be deterred by this short sighted economy, for, in spite of the handicap, the author has succeeded in welding into an interesting whole what must have been in the first instance a stimulating series of separate lectures. Students of plant breeding and genetics in the Latin countries, with scientific and technical translators and abstractors and scientific libraries in other parts of the world as well, should be much indebted to Professor Chouard for his valuable work.

CUÉNOT, L.
L'évolution biologique. (**Biological evolution**).
Masson et Cie, Paris 1951 : 2500 fr.: Pp. ix + 592 : 197 figs.

In the preface to this work, his last published

treatise, Professor Cuénot recalls his first studies at the Sorbonne in 1883, when Darwin's name and the subject of evolution were equally ignored. The change over in France has come about very largely through the influence of Professor Cuénot, and the volume now under consideration represents a valuable and detailed conspectus of his views on evolution and allied topics. The author unfortunately did not live to see his work through the press, and the final stages of publication were attended to by his collaborator Mlle. Tétry.

The complete work is encyclopedic in form, covering almost the whole of the relevant field of modern evolutionary and genetic theory, except the Soviet school, which the author regards as adequately debunked by J. Huxley. As is perhaps inevitable, the vast field covered entails a somewhat cursory treatment of much of it. Eugenics, for instance, where the author proceeds with much circumspection, is treated in a chapter of one and a quarter pages. However, most of the relevant data are squeezed in somewhere so that the whole work provides a valuable source of reference.

The arrangement followed is a division of the volume into two very unequal parts, the first, *Les faits*, presenting the data about which most biologists are in agreement, and the second, *Les incertitudes*, dealing with those topics about which the author has some misgivings.

The first part contains little that will not be familiar to readers of the standard text-books on evolution and genetics in English. The second part is in some ways the most interesting since it deals, though not in any great detail, with the reasons why Professor Cuénot cannot assent to the current form of neo-Darwinism, with its insistence on the dominating role of natural selection. These reasons include the well-known difficulty of explaining orthogenesis along neo-Darwinian lines, the doubtful selective value of many types of animal coloration, the uncertainty as to whether acquired characters are not under some circumstances inherited, and the difficulties raised by the attitude taken by neo-Darwinists to the questions of chance and finality. The author makes clear that he distrusts extreme neo-Darwinism but the alternative he envisages is hinted at rather than depicted. The conclusion suggests that the philosophy which forms the appropriate background to evolutionary theory is a mild pantheism, associated, though in a way which the author does not indicate, with a spirit of universal toleration.

Clapham, A. R., Tutin, T. G. and Warburg, E. F.
Flora of the British Isles.
Cambridge University Press 1952 : 50s. : Pp. li + 1591 : 79 figs.

It is well-known that all the standard British floras in current use date from the middle of the last century so that those wishing to avail themselves of later discoveries have to delve into a scattered and often rather inaccessible literature. The new flora, here under consideration, remedies this unsatisfactory position so effectively that its predecessors will soon be of historical interest only. It deals, like its forerunners, with ferns and flowering plants, and overrides a frequent form of botanical snobbery in including many commonly encountered introduced species. The number of species described is naturally greater than in the earlier works, possibly too much so, since it is not unlikely that future work will throw doubt on the value of the species splitting that has run riot in some instances. Nomenclatural changes are also fairly numerous, and though certain to annoy, could hardly have been avoided. The descriptions are good, and supplemented in critical cases by clear line drawings. Data are added on habitat, distribution in the British Isles and beyond, pollination and seed dispersal mechanisms, life form according to Raunkiaer's system, and, where known, the chromosome number.

The new flora must inevitably take its place as the standard British flora from now on, and it is only to be regretted that its high price will place it beyond the reach of many of the amateur and other naturalists who have depended till now on the earlier floras.

Schilder, F. A.
Einführung in die Biotaxonomie (Formenkreislehre). [**Introduction to biotaxonomy (theory of Formenkreise)**].
Gustav Fischer, Jena 1952 : DM 13.50 : Pp. IV + 161 : 123 figs.

Most geneticists and plant breeders have occasion to be disturbed by the inflexible compilers of floras who list and describe the taxonomic species of their region as though each was an entity in its own right equivalent in status to all the others. Even the chromosome number sometimes thrown in to placate the critic hardly suffices to remove suspicions that the entire classical taxonomic set-up is quite inadequate for genetical or breeding work.

A perusal of Professor Schilder's *Introduction* is therefore to be strongly recommended to all

those who think too rigidly in terms of the taxonomic species, or who are seeking relief from this incubus. In comparatively few pages and in a style of the utmost logical transparency, the author outlines principles for studying groups of related organisms without the preconceived notions implicit in the older taxonomic categories. The taxonomic species is indeed introduced, defined as the aggregate of potentially interfertile organisms capable of producing fully fertile offspring, and then bundled ignominiously off the stage as quite impractical, to be replaced by the superspecies or Formenkreis, defined as the aggregate of related forms that replace one another either geographically, ecologically or chronologically, and thus corresponding to something which may be anywhere between the species and genus inclusively. The *Introduction* is mainly devoted to the types of superspecies, differentiated according to the frequency of their component subtypes, the distribution of these over the world's surface, and in some cases in three spatial dimensions and in time, and the continuous or discontinuous nature of these distributions.

The general principles found to govern variation within a Formenkreis are briefly mentioned, in particular the correlations between variation and climatic factors. The whole theoretical treatment is compressed into 46 pages, and is followed by examples of its application, based mainly on zoological work.

It is probably true to say that, so far, analysis of Formenkreise has been pursued more by zoologists than botanists. Its great usefulness for botanical work is however indubitable, and Professor Schilder's admirable and succinct *Introduction* can be recommended without reserve to all desiring to utilize taxonomic procedures possessed of some of the suppleness of the organisms they purport to describe.

MEIJER, H.
Rural Brazil at the cross-roads.
H. Veenman & Zonen, Wageningen 1951 : Bound $2·50; unbound $2·00 : Pp. 208 : maps : tables : diags.

The consequences of land utilization based on "the almost unlimited area of land suitable for agricultural purposes, lack of care for the future in a broader sense and the 'get-rich-quick' mentality" form the basis of this study of rural Brazil. Apart from the area of the Amazon basin, the country is made up of vast tracts of land, originally heavily forested. In the more occupied regions, i.e. those nearest the coast, the practice has been to burn these, raise a highly remunerative crop on the very fertile virgin soil for a few years, and then abandon it to cattle grazing without any attempt at reafforestation. This process has been repeated progressively towards the interior of the country, thus bringing the centres of production further and further from the areas of consumption. Combined with very primitive agricultural methods, poor transport and lack of capital or technical knowledge to improve them, the point has now been reached where, the author claims, a radical change in the economy of production in the country as a whole is an imminent necessity. The recent "Salte" plan of the Brazilian government for improving the national economy and raising the standard of living is a comprehensive and ambitious programme covering health and nutrition, transport and power production. In addition to this the author discusses other essential features necessary for bringing about any general improvement in rural production: these include economic, social and educational matters as well as transport, soil conservation, mechanization, etc. His proposal is that the best immediate approach to the problem is to bring about an intensification of efforts towards an improved economy in the areas nearest to the cities, which are the principal centres of consumption. Ways in which this could be brought about, the difficulties and probable consequences are carefully studied.

The approach to the problems discussed is primarily economic. Valuable information for the agriculturalist, forester, and stock breeder on the principal crops such as coffee, maize, cotton, sugar and cocoa, and stock rearing is also given in Part I, which describes rural Brazil in the first half of the present century. In Part II, which deals with the forthcoming changes, a chapter is devoted to the improvements necessary in crop production. Throughout, problems are related to the human factor, the characteristics of the Brazilian population, without which no study of this nature could be effective. R. H. R.

VAN HALL, C. J. J. and VAN DE KOPPEL, C.
De Landbouw in den Indische Archipel. Deel III. (**Agriculture in the East Indies. Part III**).
N.V. Uitgeverij W. van Hoeve, 's-Gravenhage 1950 : 27·56 fl. (Bound) : Pp. 756 : figs. : tables : graphs.

The final volume of this inestimable work (cf. *Plant Breeding Abstracts*, Vol. XVIII, p. 599; Vol. XIX, p. 433 and Vol. XX, p. 834) is

perhaps the least interesting, if the most informative, of the four. The first part comprised a general introduction to the subject, and was followed in the two volumes of the second part, by articles on food, medicinal and narcotic crops, and spices. This third part deals with fibres and other industrial crops, including rubber, gutta percha, ethereal oils, tanning materials and dyestuffs, derris, castor oil, tung, benzoin and sandalwood. To the planter, however, the volume is full of interest, because the country, under the Dutch, was in the van of scientific research, especially as regards plantation crops.

Most of the important crops grown in the Netherlands Indies are not indigenous there, not even that universally known as Java kapok, although the cultivation of this has certainly flourished in Indonesia for at least a thousand years. But to call cotton, roselle, and ramie crops of Indonesia is pure optimism, for, despite favourable conditions during recent years, the difficulties encountered in trying to establish their cultivation are considerable. Cotton has made little progress despite efforts since 1830 to establish it. Although in 1928 nearly twenty-five million guilders were spent on the importation of some fifty million sacks, and although attempts were being made before 1900 to establish a fibre industry to reduce this import, by 1937 only 2500 acres of roselle were planted, despite the manufacture in Java of nine million sacks in 1941. Ramie too is an insignficant crop.

The cultivation of sisal is more successful, and Indonesia was growing about one-third of the world's production. Efforts were made, however, to keep the art a secret by the company chiefly concerned. Even in 1939, when 106,000 tons of rope fibres were exported, 62,000 of the 70,000 thousand tons from Sumatra came from estates that refused to give information about production or to receive visitors. The Central Office for Statistics, which publishes particulars of exports, reports that the data for fibres are "exceptionally incomplete."

The chapter on new crops for the country contains some interesting suggestions, such as: *Mundulea sericea*, a green manure bush and source of a useful insecticide; *Clausena anisata*, which produces aniseed oil in three years, whereas *Illicium* starts only at sixteen years old; and *Amorphophallus oncophyllus*, whose roots contain mannan and provide a mediocre creaming agent for rubber latex and a precipitator for silt in drainage water, the meal being also used for paste and waterproofing textiles. *Lonchocarpus* and *Pyrethrum* are the only exotic plants mentioned here. It is strange to find the latter, whose flowers form a colourful carpet in some of the English fens, recommended as a crop for a country in the wet tropics. Thus, at the moment of our parting, East appears to meet West; but with the difference that whereas the English flowers are red, the Indonesian are white. C. B.

Gazetteer of agricultural and forestry research stations in the British Commonwealth.

Commonwealth Agricultural Bureaux, Farnham Royal 1952 : 38s. : Pp. xix + 517 : tables.

This gazetteer, published for the first time, is a companion volume to the List of Research Workers in Agriculture and Forestry in the British Commonwealth. It has been compiled from material supplied by the governments, and provides particulars of over a thousand research stations and laboratories and experimental farms, dealing with almost every branch of agriculture and forestry, under very considerable variation in climatic and soil conditions. After an account of the organizations serving Commonwealth countries as a whole, viz. the Commonwealth Agricultural Bureaux, Commonwealth Economic Committee and Bureau of Hygiene and Tropical Diseases, research stations are listed in order of countries. Within each country section, the arrangement of the entries is as far as possible along administrative lines. The particulars given for each research station follow a standard order: location (including latitude and longitude); climate; altitude; soil; crops; research; and postal address. Alphabetical indexes of stations and subjects of research are provided.

Handbook of Canadian cereal varieties of barley, field beans, flax, oats, spring wheat and winter wheat.

Plant Products Division, Production Service Department of Agriculture, Ottawa 1952 : $3·00 : Pages unnumbered : plates.

This handbook provides general information and descriptive notes on varieties of the above crops grown in Canada. In the case of wheat, oats and barley photographs showing the characteristics of the spikes, spikelet or panicle and of the grain are given for most varieties. The list is a handy size and its loose leaf arrangement permits the addition of new descriptions and revision of old descriptions. It is expected that this useful handbook will be revised each year.

VAVILOV, N. I. and FREIER, F. (Translator).
Estudios sobre el origen de las plantas cultivadas. (**Studies on the origin of cultivated plants**).
Acme Agency, Buenos Aires 1951 : Pp. xxii + 185 : 55 Arg. pesos : 7 maps : 6 figs : 15 tables.

This book should be of immense value to Spanish-speaking students of genetics and plant breeding in that it unites in one volume four of Vavilov's most important works. Three of these were formerly published in relatively inaccessible Russian journals with English translations of very low standard. Indeed, one finds that the Spanish text is far easier to understand and possesses none of the ambiguities and errors of the English translation.
The difficulties in rendering technical terms, which often differ according to local usage in Spain and the various South American countries, are insurmountable until some sort of standard technical vocabulary is agreed upon. Meanwhile, however, it would seem that the translators have used a generally clear and acceptable range of words. The reviewer cannot agree, nevertheless, with the practice of translating both *"systematics"* and *"taxonomy"* as *"taxonomía,"* when the perfectly acceptable word *"sistemática"* is available.
The four works of Vavilov included in this book are:
(1) Studies on the origin of cultivated plants.
(2) Geographical regularities in the distribution of the genes of cultivated plants.
(3) The problem of the origin of fruit trees, with special reference to the wild ancestors of the fruit trees of Turkestan and the Caucasus.
(4) The new systematics of cultivated plants.
The maps, drawings and tables of the Russian originals are also included. The various coloured map symbols do not seem to have been reproduced quite so well owing to the reduction in size, but are nevertheless fairly legible.
The book is printed clearly, apart from the map symbols mentioned above, and with a minimum of typographical errors. J. G. H.

PYENSON, L. L.
Elements of plant protection.
John Wiley & Sons, Inc., New York and Chapman & Hall, Limited, London 1951 : 40s. : Pp. x + 538 : 226 figs : 50 tables.

With the cost of book production at its present level it is certainly wise for author and publisher to effect what economies they can without prejudicing book production, especially textbooks for students. In Pyenson's *Elements of Plant Protection* costs have, presumably, been cut by photolithographic reproduction of a copy with unjustified margins, which perhaps have no worse effect than the irritation of the reader. The temper of the latter will further deteriorate on reaching p. 336 when his reading is interrupted in the middle of a sentence by three pages of tables. The final form of the book might have been happier, nevertheless, if greater efforts had been made to weed out the large numbers of redundant figures which in no way enhance what is otherwise an exceptionally well-illustrated volume. Of numerous excellent line drawings and photographs, perhaps those illustrating the general features of insects and their life histories are the most outstanding, and would serve equally well to grace many a text book of entomology. It is surprising, therefore, to find such a singularly pointless drawing as Fig. 82 of "A robin's nest in a tree" on p. 189.
A comprehensive treatise on plant protection is certainly provided, although specific information on many plant diseases is not included, the book being intended for use in conjunction with extensive field and laboratory study. Insect and other invertebrate pests, injurious vertebrates, plant pathogens and weeds are all treated. In each case there is an introduction covering the general features and classification of the category of plants or animals under consideration, and this is particularly well presented in the case of insects. A thorough understanding of the habits and life histories of the organisms is insisted upon and in each section several fully illustrated life histories are given to demonstrate the general principles. Here, however, redundant diagrams abound in the form of graphic life cycles. These may occasionally be useful, but descend to the ridiculous when over half a page is occupied on p. 349, with "the life history of a typical summer annual". Such diagrams are useful, as a rule, only to the least intelligent of students, who can reproduce them perfectly with only the haziest notion of what they are meant to convey. The author denounces "parrot-like acquisition of information" in his preface, but provides an easy source of something equally unintelligent, without which the book would be appreciably reduced in size.
Following these life histories is a detailed consideration of chemical, cultural, biological and other methods of control, and three chapters on application equipment and its

maintenance. Plant ailments due to environmental conditions as distinct from disease-producing organisms are also considered, although in no great detail.

Whatever the defects, they are only incidental in a book which should be of outstanding value, particularly in America, to students of agriculture. It is to be regretted, however, that the author gives scientific names only for the benefit of teachers, that they "may be sure of the identity of the organisms involved", a corresponding certainty on the part of the student being apparently considered unnecessary.

R. H. R.

PAINTER, R. H.

Insect resistance in crop plants.

Macmillan Co., London and New York 1951 : 71s. : Pp. 520 : 67 figs. : 25 tables.

The extraordinary complexity of interrelationships between living organisms can nowhere be more manifest than in the field of applied entomology. The full investigation of insect resistance in crop plants requires prolonged and coordinated study by entomologists, agronomists and geneticists which, of course, raises further problems of human relationships.

Here, from the hand of an entomologist, is a book which presents the intricacies of the subject with a balanced analysis of all its aspects, thus greatly assisting the research worker in whichever specialized department is his special interest. While largely collative in nature, the work succeeds in weaving together all the relevant strands and in giving a clear presentation of the whole. The conclusions presented are tentative, but based on the wide experience of the author over many years at the Kansas Agricultural Experiment Station. The introduction places the whole subject in perspective and discusses the problems of insect resistance in relation to other aspects of both economic entomology and plant breeding. Chapters dealing with the mechanisms of insect resistance, and the factors influencing its expression, in so far as these are known, are followed by a detailed presentation of the available data with regard to wheat, maize, cotton, sorghums and potatoes. A consideration of the methods and problems of plant breeding for insect resistance forms the final chapter of the text. Of no lesser importance, however, are the detailed bibliographies, which will make this book of permanent value as a standard work of reference. These are given at the end of each chapter and a supplementary classified bibliography of over 60 pages is included at the end of the book. The author is to be congratulated on the skill with which he has presented his material and has arranged his bibliographies to facilitate reference to any particular branch of this highly ramified subject.

R. H. R.

KALSHOVEN, L. G. E.

De plagen van de cultuurgewassen in Indonesië, (**Pests of cultivated crops of Indonesia**). **Parts I and II.**

N.V. Uitgeverij W. van Hoeve, s'Gravenhage / Bandoeng 1951 : fl 39, 50 : Pp. 1065 : 16 plates : 578 figs.

Dammerman's book, published in 1919, and somewhat revised and adapted in English translation as *The Agricultural Zoology of the Malay Archipelago*, was already long out of date when the present author was seconded to produce a new work in 1939. No sooner were preparations begun, than they were interrupted by the invasion, and not until 1948 could the work be started again. By this time most of the data collected by private research stations, which had reached an unusually high state of development in the Netherlands Indies, had been lost during the occupation. The work is based on information contained in annual reports on diseases and pests and unpublished notes in the Instituut voor Plantenziekte [Phytopathological Institute].

The first volume deals with worms, gasteropods, arthropods, and insects, and includes a ten-page account of the giant snail, whose epidemic progress, twenty years ago, from Kedah to Johore in a few months, the author considers to have been passive. Nevertheless, on estates, the front could be seen to have advanced hundreds of yards in a few days. Fortunately ducks and some Asians appreciate this latex-imbibing gasteropod as food.

The second volume finishes off the Lepidoptera, and includes Coleoptera, Hymenoptera, Diptera, Aves and Mammalia. The last two occupy a mere 23 and 28 pages respectively. In this volume, also, are the index, which gives vernacular as well as scientific names of plants and pests; addenda and corrigenda, which include revised names of the aphids; and explanations of the very terse abbreviations used in the references to the literature in each section of the book.

The work is not a textbook and does not deal exhaustively with purely scientific aspects, such as systematics, morphology, physiology or ecology, but gives only sufficient comment on families and groups to enable their biological and economic importance to be appreciated. Considerable attention, however, is given to

eelworms and termites, which are insufficiently treated elsewhere. Crops are arranged after Hutchinson's classification and pests under each crop in order of importance and degree of damage, ranging from ! ! ! for complete crop failure, through ! ! meaning serious damage, to ! which indicates that protective measures should be taken as damage may become serious.

The author found it impractical to provide a key for identification. Of far more use to the grower, however, is the list of crops and weeds with the names of the pests that attack them.

To a layman, the illustrations and coloured plates are unusually good, while the production is excellent. Separate English captions to the illustrations are provided below the Dutch, except for Aves. The provision of vernacular names of crops and pests makes the work invaluable for reference, for it is extremely difficult to know what crop or pest is referred to by a vernacular name, even for many who may happen to know the one of the many Indonesian languages that is being used—and that is by no means always that of the district concerned. Thus, together with the captions, there is a multilingual glossary of names. C. B.

NEW JOURNALS

The Reports of the Institute for Agricultural Research, Tohoku University.

Eight papers by members of the Institute for Agricultural Research, Tohoku University, are collected to form the first of a series of publications comparable with three allied series containing reports from institutes at Tohoku concerned with other branches of scientific research. Two of the eight papers are of interest to plant breeders and have been summarized in Absts. 1940 and 1954.

All communications should be addressed to the Director for Agricultural Research, Tohoku University, Sendai, Japan.

The Windmill.

The main purpose of the popular new quarterly magazine *Windmill* is to promote the export trade of the Netherlands in seed potatoes, seeds and livestock, by providing suitable information on Dutch agricultural methods and products. The first few numbers include articles on the Netherlands Descriptive List of Varieties of Field Crops (cf. p. 169), potato breeding, inspection of seed potatoes, seed production of flax and other crops, and Dutch barley varieties. Each article appears in four languages: English, French, Spanish and German. The journal is published by the Stichting Agrarisch Exportblad, Doorniksestraat 53, the Hague, Holland.

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